2009 IEEE INTERNATIONAL ULTRASONICS SYMPOSIUM AND SHORT COURSES

Sponsored by the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society
Under the aegis of the Presidency of the Italian Republic
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Welcome from the General Chair

Massimo Pappalardo
University Roma Tre
General Chair

Welcome to Roma!

I am pleased to welcome you to the 2009 IEEE International Ultrasonics Symposium in Rome from September 20 to 23 at the Ergife Palace Hotel.

It is a great honor and a great pleasure to have had the opportunity to organize the International Ultrasonic Symposium in Rome. In this city, shortly after the end of the second World War and a few years before the birth of our Society, was held one of the first international congresses on Ultrasounds (International Congress on Ultracoustics, Rome June 14-17, 1950). After 59 years the international scientific community, engaged in the by now numerous and important applications of ultrasounds, meet again in this historical and beautiful city. From the date of that first post-war conference till today the technical and technological progress has indeed been great and astonishing even to experts in the field. Our Society has given an important contribution, particularly in sensors, devices for telecommunications, non destructive testing, and medical diagnostics. The symposium is by now the window to observe what is really new in these fields, and I am sure that this venue in Italy will stimulate young researchers to a new and profitable interest both in this country and, I hope, in all the world.

I am sure that you will enjoy your visit to Rome, which is
rightly known as one of the most beautiful and interesting cities in the world. It is a city of culture and history, packed with the remains of well over two thousand years on inhabitation. Founded around the middle of the 8th cent. BC, for almost 1000 years Rome was the largest, richest, and politically most important city in the Western World. Today you can still admire the majestic monuments of the ancient Roman Empire: the Forum, the Coliseum, and the Pantheon just to mention a few. But, besides being the city of the Emperors, Rome is also the city of the Popes, who from the very beginning established Rome as the center of Christianity, and the city remained the cultural center of the Western World attracting the greatest artists and architects creating masterpieces of painting and sculpture and an endless number of grand, beautiful churches and palaces.

I look forward to meeting you in Rome.

Massimo Pappalardo
2009 IEEE Ultrasonics Symposium General Chair

Venue

Ergife Hotel
Via Aurelia, 619 - 00165 ROME - Italy
Tel. +39 06 66441
Fax +39 06 6632689
E-mail: info@ergifepalacehotel.com
Registration

The registration desk is located in Volubilis Room. The hours for the registration desk are:

- Saturday September 19: 6pm-9pm
- Sunday September 20: 7am-6pm
- Monday September 21: 7am-6pm
- Tuesday September 22: 7am-6pm
- Wednesday September 23: 7am-1pm

Registration and fees

<table>
<thead>
<tr>
<th></th>
<th>Gala Dinner</th>
<th>Before Sept 4th</th>
<th>After Sept 4th</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEEE Member</td>
<td>Included</td>
<td>$525</td>
<td>$650</td>
</tr>
<tr>
<td>Non-IEEE Member</td>
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<td>$730</td>
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<td>$35</td>
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<tr>
<td>Guest</td>
<td>$35/each</td>
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<tr>
<td>Short Courses:</td>
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<td></td>
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<tr>
<td>Member/Non-member</td>
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<td>$150/each</td>
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<tr>
<td>Student/Retiree</td>
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</tbody>
</table>

Notes:

- Full Registration (IEEE Member, Non-IEEE Member, Student, Retiree) will include one DVD conference proceedings and admission to the Gala Dinner Awards Reception Monday September 21st.
- Life Member is defined by IEEE as at least 65-year old and the age plus years of IEEE membership should be equal or greater than 100. Life members should show their IEEE Life Member card or evidence of Life Membership when getting registration materials.
- One-Day Registration includes event tickets for the day of registration only.
2009 IEEE International Ultrasonics Symposium

- Guest Registration includes two evening guest refreshments Sunday and Tuesday. Guests must register for the guest program in order to be allowed to register for the banquet. Guests are NOT allowed to attend any technical sessions except for the Monday morning plenary session.
- Short course attendees must register for the conference (at least a one day registration) in order to be able to register for the short courses.
- Students are required to show their valid identifications (IDs) to the registration desks to qualify for the student rates and get any registration materials.

Local Transportation

Transportation to/from the Ergife Hotel

From/to the airports - day time

Fiumicino and Ciampino airports are both about 30 Km from the centre of Rome and are both well linked with the two principal railway stations (Termini station and Tiburtina station) by trains.

From/to Fiumicino International Airport (FCO)
Rome's main airport is well-connected to the center during the day by a direct train. The direct train between Fiumicino and Termini costs € 11.00 and takes approximately 30 minutes. Tickets can be purchased at vending machines, ticket offices and other vendors at both Termini and Fiumicino.

schedule: every 30 minutes
Fiumicino - Roma Termini from 6.37am until 11.37pm
Roma Termini - Fiumicino from 5.52am until 10.52pm

When you are in Roma Termini (the principal railway station in Roma), you can use the follow route calculation that use only public means to reach the Ergife area.

- Departure from Roma "Stazione Termini"
- Walk 50 meters
- Go to stop Termini METRO A
- Take Line METRO A (direction BATTISTINI) to 10 stops (METRO A every 3 min.)
- Get off at stop Cornelia
Walk 100 meters
Go to bus stop C.NE CORNELIA/AURELIA (you are 1000 mt. away from the Ergife Hotel)
Take Line Bus 246 (MALAGROTTA) to 3 stops (line 246 every 12 min.)
Get off at stop AURELIA/DA ROSATE
Walk 150 meters to via Aurelia 619, the Ergife Venue

From/to Ciampino International Airport (CIA)
A smaller airport dealing mainly with charter flights and budget airlines. It is connected to Line A metro station Anagnina by Cotral buses; ticket costs € 1,03. Buses leave the airport every 30-60 minutes. Take Line Metro A (direction Battistini) and get off at stop Cornelia. You can take the line bus 246 (Malagrotta) to 3 stops and get off at stop Aurelia/Da Rosate, or you can walk from Cornelia stop to the Ergife (about 1000 mt.)

From/to the airports - night time
Fiumicino
For arrivals and departures between 11.30pm and 5am, a night bus connects Fiumicino with Tiburtina station, stopping also at Termini Station.
From Fiumicino: 1.15am - 2.15am - 3.30am - 5.00am
From Tiburtina: 0.30am - 1.15am - 2.30am - 3.45am
The 40N bus connects Tiburtina and Termini during the night.

Ciampino
Buses connecting Ciampino airport with the centre of Rome stop running at 11pm, so the only way to get into town late at night is by taxi.

Taxi from/for airport
The price for a ride from Leonardo da Vinci (Fiumicino) Airport to the city centre (within the Aurelian Walls) is about Euro 40,00-50,00.

The price for a ride from Ciampino Airport to the city centre (within the Aurelian Walls) is about Euro 30,00-40,00.
You may be approached by illegal taxi drivers in the station and at the airport. If you need a taxi, look for the official white taxis which have meters. There are taxi stands at both Fiumicino, Ciampino, and Termini.

Info: tel. +39 060606 or +39 06 671070844

An exhibitors breakfast will be held Wednesday Sept 23\textsuperscript{rd} from 7-8am in the Moesia Room (Coffee, tea, pastries).

Exhibits will be in Sala 3. Companies will display their products and representatives will be there to meet conference attendees. The exhibitors will be in place on the following dates and times:

Monday-Tuesday 8:30-5pm and Wednesday 8:30-1pm

Registered Exhibitors: (as of 7/2/2009)

1. LECOEUR ELECTRONIQUE
   www.lecoeur-electronique.com
2. POLYTEC GmbH (+BPS)
   www.polytec.de
3. BPS s.r.l. (co-exhibitor of POLYTECH)
   www.bpsweb.it
4. Sonora Medical Systems
   www.4sonora.com
5. IMASONIC
   www.imasonic.fr
6. DASEL
   www.daselsistemas.com
7. Ferroperm Piezoceramics A/S
   www.ferroperm-piezo.com
   www.ferroperm.net
8. kibero GmbH
   www.kibero.com
9. Sound Technology, Inc.
   www.sti-ultrasound.com
10. Valpey Fisher Corporation
    www.valpeyfisher.com
11. Electronics & Innovation, Ltd.
    www.electronicsandinnovation.com;
12. The Piezoinstitute c/o Ferroperm Piezoceramics A/S
www.piezoinstitute.com
13. Weidlinger Associates
www.wai.com
14. Ultrasonix Medical Corporation
www.ultrasonix.com
15. Precision Acoustics Ltd.
www.acoustics.co.uk
16. Onda Corporation
www.ondacorp.com

Industrial Forum

Moesia Room Wednesday September 23rd 1-2:30pm
Industrial forum is intended to give the Exhibitors the opportunity to present recent developments or applications of their products or technology.

Plenary Session

Date, Time, and Location:

- 8:00 a.m. – 9:30 a.m.
- Monday, September 21, 2009
- Room: Leptis Magna

Agenda:

Welcome:

- Massimo Pappalardo, Ph.D., General Chair, 2009 IEEE International Ultrasonics Symposium (IUS)
- Mauricio Pereira da Cunha, Ph.D., Vice President of the IEEE Ultrasonics, Ferroelectrics, and Frequency Control Society (UFFC-S) for Ultrasonics
A new approach to the study of Heart Sounds

Heart Sounds have a fundamental role in cardiac semiotics. However, a deterministic and unambiguous association between noises in cardiac dynamics has yet to be accomplished due to the many and different overlapping events which contribute to the acoustic emission. The current computer-based capabilities in signal processing enabled us to move beyond the standard cardiac auscultation. Its improved form, like hi-tech phonocardiograms, allow us to pay attention to unexplored characteristics of heart-related sounds: their spatial distribution on the chest surface and their time evolution. In this presentation, we will describe results obtained using new instrumentation and a new sound visualization technique designed to enable the association of the spatial distribution of the heart acoustic emission with physiological and pathological patient condition.

prof. Giorgio Parisi
Giorgio Parisi was born 8/4/48 in Rome, Italy. He graduated from Rome University in 1970, his thesis supervisor being Nicola Cabibbo. He has worked as researcher at the Laboratori Nazionali di Frascati from 1971 to 1981. In this period he has been on leave of absence from Frascati at Columbia University, New York (1973-1974), at the Institute des Hautes Etudes Scientifiques (1976-1977) and at the Ecole Normale Superieure, Paris (1977-1978). He became full professor in 1981. From 1981 to 1992 he was full professor of Theoretical Physics at the University of Rome II (Tor Vergata), becoming later professor of Quantum Theories at the University of Rome I (La Sapienza). He received the Feltrinelli prize for physics from the Accademia dei Lincei in 1986, the Boltzmann medal in 1992, the Italgas prize in 1993, the Dirac medal and prize in 1999, the Enrico Fermi Prize in 2003, the David Heinmann Prize in 2005, the Galileo Prize in 2006 and the Microsoft European Science prize in 2007. He became correspondent fellow of the Accademia dei Lincei in 1987 and fellow in 1992; he is also fellow of the French Academy from 1993, of the Accademia dei Quaranta from 2001 and of the US Academy of Science from 2004.

Awards and Recognitions:

**IEEE Awards:**
IEEE Fellow Award 2009

**IEEE UFFC Society Awards:**
Achievement Award 2009
Distinguished Service Award 2009
Outstanding Paper Award 2008
2009-2010 Distinguished Lecturer Award

**Ultrasonics Award:**
Rayleigh Award 2009

Note: The order of presentation of awards is to be determined
Student Lunch

All students attending the Conference are invited to attend a complimentary standing buffet lunch from 1:00-2:30pm Monday September 21 in the Moesia Room.

Awards Reception

The Gala Dinner Awards Reception is included in the full conference registration: The reception will be held Monday September 21st at the restaurant Le Quattro Stagioni (inside Ergife Hotel) from 8pm to 11pm. Tickets to this event are included in full registration. Life members, one day registrants and guests may purchase tickets at a cost of $35.00 per person.

Guest Program

We encourage guests of conference attendees to register. The registration fee of $35 US Dollars permits you to attend the evening guest refreshments Sunday September 20th and Tuesday September 22nd from 4:00 pm – 6:00 pm. The evening guest refreshments will provide an opportunity to meet fellow guests and coordinate daily excursions and activities. The Gala dinner awards reception Monday September 21st is not included in guest registration but can be added at an addition charge of $35 US Dollars per guest. Guest registration is required in order to register for the Gala dinner awards reception.

Guests should register with their accompanying conference attendees on the conference registration form. Guests are not allowed to attend any technical sessions except for the Monday morning plenary session.

Five individually priced guest tours have also been arranged, see below. We are pleased to announce that there is no minimum registration requirement for the guest tours this year, so there is no risk of a tour being cancelled due to too few registrants. There is an English tour guide on the tours.
Guest refreshments include coffee, tea and pastries on Sunday and Tuesday evening from 4:00 pm – 6:00 pm in the Moesia room or outdoors (weather permitting). The Ergife Palace Hotel will also be the departing and return points for the guest tours.

Note: The guest Refreshments are for registered guests only.

Guest Tour 1 – Classic Rome, Monday morning, Sept. 21
Guest Tour 2 – Imperial Rome, Monday afternoon, Sept. 21
Guest Tour 3 – Vatican Museums, Tuesday morning, Sept. 22
Guest Tour 4 – Papal Audience, Wednesday morning, Sept. 23
Guest Tour 5 – Christian Rome, Wednesday afternoon, Sept. 23

POST CONFERENCE TOURS
The IUS 2009 Committee has organized two individually priced tours for the attendees after the 2009 IEEE International Ultrasonics Symposium. We are pleased to announce that there is no minimum registration requirement for the tour this year, so there is no risk of a tour being cancelled due to too few registrants. There is an English tour guide on every tour.

PC-Tour 1 - FIRENZE

3 days (2 nights in a First Class hotel, 1 meal and 2 breakfasts)

From September 24 to September 26, 2009

Florence, the cradle of the Renaissance period, where you breathe art in its Medieval streets, the craftsmen’s workshops and the Renaissance Palaces. Here, the memories of the Medici family are linked with the splendor of the works of renowned artists like Michelangelo, Leonardo da Vinci, and Botticelli.
Three days to discover not only the excavations of the ancient city of Pompeii but also to see the breathtaking coastline of the Sorrento Peninsula and Capri, the jewel of the Mediterranean sea. This is a journey to discover art, history, folklore and archaeology in the most beautiful region of southern Italy.

**Shopping and Food**

Choosing the venue for a congress is never easy. The success of a congress often depends on aspects that are apparently of secondary importance: organizational ability and efficiency, technological facilities, the elegance of the venue and quality of the accommodation and its amenities.

However what counts above all else is the prestige of the location. In this sense, Rome is ideal, with its fascinating and uniquely special setting, abounding in history. The city’s historical, archaeological and architectural heritage is breathtaking; in addition, the pleasures of excellent cuisine are always offered, and a trip to the shops is essential.

We would like to suggest some shopping & food around the Ergife Palace Hotel (within 500 m), to simplify the congressman's life!
FOOD

1) Chinese Restaurant - **Xian Du**, via Aurelia 611-613 - phone 0666418808 - 100 seats - 5/20 €
2) Pizza - **Mille Pizze E ...**, via Aurelia 601 - phone 0666415457 - closed on Sunday - 50 seats
3) Bar, coffee, breakfast - **Matrix Bar**, via Aurelia 558 - phone 0645448323
4) Pharmacy - Medicine shop
5) Cigarettes and tobacco
6) Bar, coffee, breakfast, ice-creams - **Bar Bonsignori**, via Aurelia 591 - phone 06469950587
7) Restaurant & Pizza - **Postodivino**, via Aurelia 528/a - phone 0666410456 - closed on Tuesdays, 70 seats
8) Restaurant - **Osteria Romana**, via Aurelia 553 phone 066623302 - 25/30€ - 90 seats
9) Restaurant, bar - **Benedetto**, via Aurelia 666/b - phone 0666415004 - 20/30€ -150 seats
10) Restaurant & Pizza - **Il Postiglione**, via Aurelia 664 - phone 066541012 - 20/30€ - 170 seats
11) Bar & Pizza - **Festival**, via Aurelia 570 phone 0666512572 - 3/10€ - 50 seats
12) **McDonald's** - P.zza Giovanni Battista De La Salle 9 - phone 0666017165
13) **Mercato Irnerio** - A typical Rome corner market

*It is possible to use the restaurant facilities of the Ergife:*
2009 IEEE International Ultrasonics Symposium

Buffet Lunch/Dinner (seated): € 35,00 per person, per service.
Buffet Lunch/Dinner (standing): € 32,00 per person, per service.
You can also have a lunch/dinner à la carte.

SHOPPING

For shopping, we suggest to move into the centre of the city. Rome, the eternal city, rich in history, art and culture but also a cosmopolitan city and important landmark in fashion and new trends. Arriving in Rome with the intention to follow a very fashionable route, therefore, you have only the embarrassment of choice.

Starting point for this unusual, but no less fascinating tour of the city can only be the elegant and famous Via Condotti, one of the favorites for foreigners to purchase in Roman ateliers, from the most important Italian and international fashion designers such as Valentino, Armani, Gucci, Dolce & Gabbana and Dior, to name a few.

Via Condotti

Of note, again in Via Condotti, the precious jewels of Bulgari, Cartier and Federico Buccellati.

Equally glamorous and elegant Via Frattina which is, together with Via Borgognona and Via Bocca di Leone, home to some major world-renowned brands such as, it is worth to mention,
the Trussardi store, the elegant shops of Cesare Paciotti and the refined Pal Zileri atelier.

Leaving the area near the Spanish Steps along via della Mercede you can arrive in Via del Corso, one of the main arteries of the city. Partially closed to traffic, it houses shops of various types, capable to meet different needs: from the clothing for women and for men, to underwear, accessories, footwear, and young and trendy fashion megastores. To see, walking along Via del Corso, the charming and characteristic Galleria Colonna (now Galleria Alberto Sordi) with many shops in complete peace and in shelter from rain and cold. Here it is just to choose between the modern and captivating "Jam", the alternative "Pinko", and the elegant Calvin Klein boutique.
Via del Corso

Walking in Campo de Fiori, you must not miss Via dei Giubbonari. While you are moving towards Piazza Venezia, you cannot do without a walk along Via Nazionale, full of shops and boutiques.

In the area of the Vatican, finally, another must-stop is in Via Cola di Rienzo, where you can range from the classic and elegant boutiques as Luisa Spagnoli, Max Mara, Cerruti and David Saddler to large chains of fashion and glamour as Mango, Miss Sixty, Ethic, Fornarina, Onix, Benetton and Sisley, for a shopping at 360-degrees.
There will be four video-message boards (40” LCD TV) for the attendees in some points of the congress-venue. The use of the message board will be available for all both leaving a message in the computer room, and by internet, using a web page of the official web site.

The entire area of the congress (lobby, common areas, session rooms) will have free WiFi. The information on the setup will be available to the congress. There is an additional charge for Internet use in the guest rooms of the Ergife Palace Hotel and an IP cable is needed.

In the computer room (Gerasa) and in the registration room (Volubilis) will be available a laser printer.
Join IEEE-UFFC Society

The Ultrasonics, Ferroelectrics, and Frequency Control (UFFC) Society of the Institute of Electrical and Electronics Engineers (IEEE) covers areas of ultrasonics, ferroelectrics, and frequency control among others. It will be very beneficial to join this excellent Society for your future professional careers. You will be able to interact with other members and contribute to the growth of the IEEE UFFC society. You will also be eligible for consideration to receive travel supports to various IEEE UFFC national and international conferences. The future of the society is in your hands. Please click on the link to join today and you will also be able to access the IEEE Transactions on Ultrasonics, Ferroelectrics, and Frequency Control (TUFFC) journal among other publications that will benefit your entire professional life. A discount membership fee is available for students.

Proceedings

The 2009 IEEE IUS Symposium Proceedings (DVD format) will be available in December 2009. To ensure a timely delivery of the Proceedings, no papers will be accepted after 8:00 A.M. Rome time. (For details on paper submission please see: http://ewh.ieee.org/conf/ius_2009/). Please note that only those papers presented in the Symposium will be included in the Proceedings. The DVD copy of the proceedings will be mailed to all paid registrants except guests and one-day registrants. A printed version of the Proceedings can be ordered from IEEE Shop: Conference Proceeding after the Symposium.
The Digital Archive is available on DVD. The entire set is available to UFFC members for $100. Yearly updates will be available free of charge to current UFFC members. Please use the online form (http://www.ieee-uffc.org/main/publications.asp) to request updates or purchase the entire set.

If you have received DVD updates but did not get all DVDs 1-5, you may need to download the indices for the DVD structure. Use this link (ftp://Indices:y3m0n5skmXQE@ftp.ieee-uffc.org/DVD_Indices.zip) to download these indices. Please note that this zip file is quite large, and will take at least 1.5 hours to download. Once the download is complete, unzip the file. Open this file and move all of its contents into your UFFC Digital Archive folder. Once this is completed, you should see the ARCINDX (2-5) folders and ARCINDX (2-5).PDX files in your UFFC Digital Archive folder. Then proceed to initialize the search engine as described in the instructions on the DVD.

Donald E. Yuhas
Industrial Measurement Systems, Inc.
Technical Chair

On behalf of the Technical Program Committee (TPC), I am thrilled to invite you to the 2009 IEEE International Ultrasonics Symposium to be held September 20-23, 2009, at
the Ergife Palace Hotel in Roma. The outstanding work of the IEEE Ultrasonics TPC group has established our Symposium as the major international forum for Ultrasonics innovation. In 2009 we will highlight 21 invited presentations covering the 5 major technical sub-groups: 1) Medical Ultrasonics, 2) Sensors, NDE & Industrial Applications, 3) Physical Acoustics, 4) Microacoustics – SAW, FBAR, MEMS, and 5) Transducers & Transducer Materials. Keeping the successful traditional events, the first day of the conference is reserved to to top quality short courses featuring expert instructors, followed by the three days of technical sessions, which include the student paper competition. The posters of the student finalists will be on display in a specially designated area for the duration of the conference.

Roma, as a venue, provides all the excitement of one of the greatest cosmopolitan areas in the world! We have confidence that our outstanding technical program and your technical contribution are a great match to the sites and charm of Roma. I hope we all share the same excitement!

All roads lead to Roma, I am looking forward to seeing you there in 2009!

Donald E. Yuhas
2009 IEEE International Ultrasonics Symposium Technical Chair

Policy on Photography

Photography or Recording:

To respect the privacy of presenters and minimize interruptions to the conference, photography and sound recording are not allowed in any technical sessions (both oral and poster) except for the plenary session.
Facilities will be available for presenters to review their presentations. Speaker Ready Room (Gerasa) will be open from 7:00 am to 6:00 pm Sunday-Wednesday.

### Short Courses

Short Courses will be held in rooms and times according to timetable which follows the listing.

#### Short Courses TIMETABLE

<table>
<thead>
<tr>
<th>Sunday, September 20 2009 (room)</th>
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</thead>
<tbody>
<tr>
<td>8:00am - 12.00am</td>
</tr>
<tr>
<td>1A (Hama)</td>
</tr>
<tr>
<td>2A (Efeso)</td>
</tr>
<tr>
<td>3A (Merida)</td>
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<tr>
<td>4A (Pola)</td>
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<tr>
<td>5A (Cesarea)</td>
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<tr>
<td>6A (Spalato)</td>
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</tbody>
</table>

#### Tutorials and Short Courses

**Course 1A**

**Film Bulk Acoustic Resonator (FBAR)**

*Richard Ruby and John Larson*

*Avago Technologies*

*U.S.A.*

**Course 2A**

**Materials for Acoustic Wave Devices**

*Manfred Weihnacht*

*IFW Dresden*

*Germany*

**Course 3A**

**Microwave Acoustic Sensors**

*Enrico Verona*
Course 4A
Seattle Therapeutic Ultrasound
Lawrence A. Crum, Joo Ha Hwang, and Michael R. Balley
Applied Physics Lab., University of Washington, U.S.A.

Course 5A
Ultrasonic NDE and Industrial Process Diagnostics at High Temperatures
Jean-Pierre Monchalin and Cheng-Juei Jen
National Research Council Canada, Canada

Course 6A
Estimation and Imaging of Blood Flow Velocity
Hans Torp and Lasse Lovstakken
Norwegian University of Science and Technology, Norway

Course 1B
SAW Modeling Techniques
Victor Plessky
GVR Trade SA, Switzerland

Course 2B
Piezoelectric Ultrasound Transducer Fundamentals - Materials, Structure, Behavior, and Analysis
Sandy Cochran¹ and Paul Reynolds²
¹Institute for Medical Science and Technology, University of Dundee, UK
²Weilinger Associates Inc., Mountain View, U.S.A.

Course 3B
Quantitative Acoustic Microscopy - Fundamentals and New Applications from Cells to Airplanes
Roman Gr. Maev¹, Naohiro Hozumi², Kazuto Kobayashi³, Yoshifumi Sajo⁴
¹Centre for Imaging Research and Advanced Materials Characterization, University of Windsor; Ontario, Canada
Course 4B
Ultrasound Imaging Systems: from Principles to Implementation
Kai E. Thomenius
General Electric Global Research
Nishayuna, NY, USA

Course 5B
Passive UHF RFID Tags, Systems, and Applications
Leonhard Reindl, Jochen Eßel, Robert Weigel
University of Freiburg and University of Erlangen-Nuremberg
Germany

Course 6B
Ultrasonic Signal Processing for Detection, Estimation, and Imaging
Jafar Saniie, Ramazan Demirli, Erfal Oruklu
Illinois Institute of Technology
Chicago, IL

Course 1C
Time Reversal Acoustics
Mathias Fink
Ecole Superiore de Physique et de Chimie Industrielles de la Ville de Paris (ESPCI)
Paris, France

Course 2C
Ultrasound Contrast Agents: Theory and Experiment
Nico de Jong and Michel Versluis
Erasmus MC and University of Twente
Rotterdam and Enschede, Netherlands

Course 3C
Zooming into the Near Field
Alireza Baghai-Wadji
RMIT University
Melbourne, Australia
Course 4C
CMUTs: Theory, Technology, and Applications
B.T. Khuri-Yakub, O. Oralkan, and M. Kupnik
E.L. Ginzton Lab., Stanford University
Stanford, USA

Course 5C
Guided SH-SAW Devices for Liquid-Phase Biochemical Sensors
Fabien J. Josse
Dept. of Electrical and Comp. Eng., Marquette University
Milwaukee, WI, USA

Course 6C
Elasticity Imaging: Dynamic Approaches
Kathy Nightingale and Mark Palmeri
Duke University
USA

Invited Speakers

Group I: Medical Ultrasonics
Jan D’hooge, Vice-Chairman

Session 1J. Cardiovascular Elastography (abstract 1422)
Room: Sala 1 Wednesday 3:30-4:00 p.m
Title: Acoustic Radiation Force Imaging
Author/Speaker: Greg Trahey
Affiliation: Department of Biomedical Engineering Duke University, Durham, N.C. US
E-mail: gregg.trahey@duke.edu

Session 1A. Targeted Contrast Agents (abstract 1198)
Room: Sala 1 Monday 11:30-12:00 a.m
Title: Molecular Imaging using Contrast Ultrasound
Author/Speaker: Alexander Klibanov
Affiliation: Cardiovascular Division, Department of Medicine, University of Virginia
Email: sklib1@gmail.com

Session 1B. Contrast Agents and Sonoporation (abstract 1354)
Room: Sala 1 Monday 3:30-4:00 p.m.
Title: Ultrasound-based imaging of nanoparticles: from molecular and cellular imaging to therapy guidance
Author/ Speaker: Stanislav Emelianov
Affiliation: Department of Biomedical Engineering, University of Texas at Austin
E-mail: emelian@mail.utexas.edu

Session 1G. Therapy Microbubbles (abstract 1499)
Room: Sala 1 Tuesday 5:00-5:30 p.m
Title: Enhancement of ultrasonic heating with microbubbles and their location in target tissues
Author/ Speaker: Shin-ichiro Umemura
Affiliation: Department of Information and Intelligent Systems, Graduate School of Biomedical Engineering, Tohoku University, Aoba 6-6-05, Aramaki, Aoba-ku, Sendai 980-8579, Japan
Email: sumemura@ecei.tohoku.ac.jp

Session 1H. Optical and Photoacoustic Imaging (abstract 1498)
Room: Sala 1 Wednesday 9:00-9:30 a.m
Topic: Optical coherence tomography: recent technical developments and the impact on clinical utility
Author/ Speaker: Melissa J. Suter
Affiliation: Massachusetts General Hospital and Harvard Medical School
E-mail: msuter@partners.org

Session 1C. New Methods and High Frequency Ultrasound for Tissue Characterization (abstract 915)
Room: Sala 1 Monday 4:30-5:00 p.m
Topic: Acoustic Microscopy – Beyond High Resolution Imaging
Author/ Speaker: Yoshifumi Saijo
Affiliation: Biomedical Imaging Laboratory, Graduate School of Biomedical Engineering, Tohoku University, 4-1 Seiryomachi, Aoba-ku, Sendai 980-8575, Japan
E-mail: saijo@idac.tohoku.ac.jp

Group II: Sensors, NDE, and Industrial Application
Jafar Saniie, Vice-Chairman

Session 4I. Energy Harvesting (abstract 957)
Room: Tarragona Wednesday 11:30-12:00 a.m
2009 IEEE International Ultrasonics Symposium

Title: Energy conversion improvement in ferroelectrics: application to energy harvesting and self-powered systems.

Author/Speaker: D. Guyomar, M Lallart

Affiliation: LGEF (Electrical engineering lab), INSA Lyon, Lyon University

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Phone: (33) 6 10 63 18 65 or (33) 4 72 43 81 58

******************************************************************************

Session 4B. Advances in NDE(abstract 681)

Room: Tarragona Monday 2:30-3:00 p.m

Title: Electromagnetic Transducers and their Potential for Modern Non-Destructive Evaluation - State of the Art and Latest Applications

Author/Speaker: Hans-Juergen Salzburger,

Affiliation: Fraunhofer-Institute for Non-Destructive Testing Campus E 3.1 D-66123 Saarbruecken Germany

E-mail: salzburger@izfp.fhg.de

Phone: + 49 681 9302 3820

******************************************************************************

Session 4E. Array Imaging (abstract 788)

Room: Tarragona Tuesday 12:00-12:30 p.m

Title: Echographic Imaging Plates


Affiliation: Applied Acoustics Institute, CSIC, Serrano 144, Madrid, Spain

Contact Person/Address: F. Montero de Espinosa Freijo Vicepresidente Adjunto de Relaciones Institucionales,CSIC Serrano 117, 28006 Madrid, Spain

Email: pmontero@orgc.csic.es

Phone: +34915855135

******************************************************************************

Session 4G. Nano-scale Acoustic Testing (abstract 613)

Room: Tarragona Tuesday 4:30-5:00 p.m

Title: Recent advances in carbon nanotubes for application to chemical and biological sensors

Author/ Speaker: F. Xavier Ruis

Mailing address: Faculty of Chemistry. Campus Sescelesades. University Rovira i Virgili. 43007 Tarragona. Spain
Group III: Physical Acoustics
Yook-Kong Yong, Vice-Chairman

Session 6E. Ultrasonic Linear Motors (abstract 1113)
Room: Baalbek  Tuesday 11:30-12:00 p.m
Title: Ultrasonic Motors
Authors: Minoru Kurosawa
Affiliation: Tokyo Institute of Technology, Japan
Email: mkur@ae.titech.ac.jp

Session 6A. Phononic Crystals-Fundamentals (abstract 126)
Room: Baalbek  Monday 12:30-1:00 p.m
Title: Phononics
Authors: Vincent Laude
Affiliations: Directeur de recherche CNRS, Institut FEMTO-ST, France
Email: vincent.laude@femto-st.fr

Session 6B. Visualization Interferometry (abstract 1190)
Room: Baalbek  Monday 3:00-3:30 p.m
Title: Laser interferometers in physical acoustics
Authors: Kimmo Kokkonen
Affiliation: Helsinki University, Finland
Email: kimkok@cc.hut.fi

Session 6I. Acoustic Propagation (abstract 1350)
Room: Baalbek  Wednesday 12:30-1:00 p.m
Title: Fundamentals of acoustics - conditions of existence of acoustic waves in crystals with surfaces and interfaces
Authors: V.I. Alshits
Affiliation: Institute of Crystallography RAS, Moscow, Russia
Email: alshits@ns.crys.ras.ru

Group IV: Microacoustics - SAW, FBAW, MEMS
Clemmens Ruppel, Vice-Chairman

Session 5D. Oscillators and Temperature Compensation (abstract 66)
Room: Pergamo  Tuesday 8:00-8:30 a.m
Title: Comparison of Quartz and MEMS Resonators and Oscillators
Author/ Speaker: Bernd Neubig
Session 5C. BAW I (abstract 1491)
Room: Pergamo    Monday 5:00-5:30 p.m
Title: The role of high Q bulk acoustic wave resonators in low power IC design
Author/ Speaker: Brian Otis
Affiliation: University of Washington
Email: botis@u.washington.edu

Session 6J. RF MEMS (abstract 55)
Room: Baalbek    Wednesday 2:30-3:00 p.m.
Title: RF MEMS: Focusing on the Next Step
Author/ Speaker: Takeo Oita
Affiliation: Nihon Dempa Kogyo
Email: oita@ndk.com

Session 5F. SAW Device Design (abstract 579)
Room: Pergamo    Tuesday 2:30-3:00 p.m.
Title: High Performance Microwave Acoustic Components for Mobile Radios
Author/ Speaker: M. Pitschi, et al
Affiliation: EPCOS AG, Univ. of Erlangen-Nuremberg
Email: maximilian.pitschi@epcos.com

Group V: Transducers and Transducer Materials
Scott Smith, Vice-Chairman

Session 5H. Novel Devices & Systems (abstract 1492)
Room: Pergamo    Wednesday 8:00-8:30 p.m.
Title: Biologically Inspired Ultrasound - its applications in NDE
Author/ Speaker: Gordon Hayward
Affiliation: University of Strathclyde
Email: g.hayward@eee.strath.ac.uk
Phone: 0141-548-2502

Session 3A. Ferroelectrets and Other Transducer Materials
(abstract 614)
Room: Sala 4    Monday 12:00-12:30 p.m.
Title: Broadband Ferroelectret Transducers
Author/ Speaker: Gerhard Sessler
Affiliation: Darmstadt TU
Email: g.sessler@nt.tu-darmstadt.de
Phone: 06151-16-2869
Session 3C. CMUT Modeling (abstract 790)
Room: Sala 4           Monday 5:30-6:00 p.m
Title: CMUTs, achievements and limitations
Author/ Speaker: Arne Ronnekleiv
Affiliation: NTNU, NUST Room 473 Besøksadresse: Elektrobygget, O.S. Bragstads plass 2a, 7034 Trondheim, Norway
Email: arne.ronnekleiv@iet.ntnu.no
Phone: +47 735 94413

Session 5I. Piezoelectric Transducer Materials (abstract 496)
Room: Pergamo       Wednesday 12:00-12:30 p.m
Title: Growth, Properties and Applications of PMN-PT based Giant-Piezoelectric Crystals
Author/ Speaker: Pengdi Han
Affiliation: HC Materials, 479 Quadrangle Dr. Suite-E, Bolingbrook, Illinois 60440
Email: han@hcmat.com
Phone: (630) 754-8621

Clinical Session

Session 1D. Clinical Ultrasound
Room: Sala 1          Tuesday

Time: 8-8:30am
Title: Recent Advances in Clinical Ultrasound (abstract 1481)
Author/ Speaker: David Cosgrove
Affiliation: Imperial College

Time: 8:30-9:00a.m.
Title: Cardiovascular Ultrasound (abstract 1501)
Author/ Speaker: Lars-Ake Brodin

Time: 9:00-9:30a.m.
Title: Current Sonographic Imaging in Obstetrics & Gynaecology (abstract 1409)
Author/ Speaker: Jurij Wladimiroff
Affiliation: Dept of Ob&Gyn, Erasmus University Medical Centre
Posters are required for all student finalists and will be displayed in a special section, PS, in the first poster session on Monday. These posters will remain on display until the final poster session on Wednesday.

This is the 9th year of the student paper competition. 19 finalists were selected at the Technical Program Committee Meeting held in Chicago, IL June 13-14th 2009. Posters will be displayed Monday-Wednesday in Sala Orange.

GROUP 1 - Medical Ultrasonics (6 finalists)

**Finalist #1.1** *Adam D. Maxwell, *Tzu-Yin Wang, *Charles A. Cain, *J. Brian Fowlkes, **Oleg A. Sapozhnikov, **Michael R. Bailey, *Zhen Xu
“The role of compressional pressure in formation of dense bubble clouds in histotripsy” *Biomedical Engineering, University of Michigan, Ann Arbor, MI, USA, **Applied Physics Laboratory, University of Washington (abstract 527)

**Finalist #1.2** *Amin Nikoozadeh, *Omer Oralkan, **Kai Thomenius, **Aaron Dentinger, **Douglas Wildes, ***Kalyanam Shivkumar, ***Aman Mahajan, ****Douglas N. Stephens, *****Matthew O’Donnell, ******David Sahn, *Pierre T. Khuri-Yakub
“Forward-Looking Volumetric Intracardiac Imaging Using a Fully Integrated CMUT Ring Array” *Stanford University, Palo Alto, CA,USA, **General Electric Corporate Research & Development, ***University of California, Los Angeles, ****University of California, Davis, *****University of Washington, ******Oregon Health and Science University (abstract 1181)

**Finalist #1.3** *Nikita Reznik, **Ross Williams, *Peter N. Burns
“Optical and Acoustic Characterization of Vapourized Perfluorocarbon Droplets as Ultrasound Contrast Agents” *Department of Medical Biophysics, University of Toronto, Canada, **Sunnybrook Health Sciences Centre (abstract 969)

**Finalist #1.4** *David Thomas, **Marcia Emmer, **Hendrik Vos, *Vassilis Sboros, **Nico de Jong
“Optical observations of microbubble oscillation in small tubes” *Medical Physics, University of Edinburgh, **Thorax Center, Biomedical Engineering, Erasmus Medical Center (abstract 495)

**Finalist #1.5 Skylar Marvel, Elizabeth Loboa, Paul A. Dayton**

“Applications of Low Intensity Pulsed Ultrasound for Functional Bone Tissue Engineering using Adult Stem Cells” Joint Dept of Biomedical Engineering, University of North Carolina-North Carolina State University (abstract 1273)

**Finalist #1.6 Ivan Nenadic, Matthew W. Urban, James F. Greenleaf**

“Ex Vivo Measurements of Mechanical Properties of Myocardium Using Lamb and Rayleigh Wave Dispersion Velocities”
Mayo Clinic College of Medicine (abstract 1285)

**GROUP 2 - Sensors, NDE & Industrial Applications (3 finalists)**

**Finalist #2.1 *Jeanne-Louise Shih, **Makiko Kobayashi, **Cheng-Kuei Jen**

“Flexible Ultrasonic Transducers for Structural Health Monitoring of Pipes at High Temperatures”
*McGill University, **Industrial Materials Institute National Research Council Canada (abstract 511)

**Finalist #2.2 *Venkata Chivukula, **Daumantas Ciplys, *Michael Shur, ***Jinwei Yang, ***Remis Gaska**

“Surface Acoustic Wave Interdigital Transducers Response to Deep UV Illumination in AlGaN/Sapphire”
*Center for Integrated Electronics, Rensselaer Polytechnic Institute, **Department of Radiophysics, Vilnius University, ***Sensor Electronic Technology, Inc. (abstract 825)

**Finalist #2.3 Atsushi Miyamoto, Mami Matsukawa**

“Measurement of three-dimensional distribution of crack tips by low power pulsed laser”
Doshisha University (abstract 1256)
Finalist #3.1 *Dana Gallimore, **Thomas Moonlight, *Mauricio Pereira da Cunha
“Extraction of Pt/Rh/ZrO₂ High Temperature Elastic Constants”
*Electrical and Computer Engineering / Laboratory of Surface Science and Technology, University of Maine, **University of Maine (abstract 513)

“Angular spectrum method for the estimation of pressure fields in the super harmonic band”
*Biomedical Engineering, ErasmusMC, **CREATIS-LRMN, University of Lyon, INSALyon (abstract 306)

Finalist #3.3 *Hengky Chandrahalim, *Sunil Bhave, **Christian Rembe, **Sebastian Boedecker, ***Ronald Polcawich, ***Jeff Pulskamp
“Heterodyne laser-doppler interferometric characterization of contour-mode resonators above 1 GHz”
*Electrical and Computer Engineering, Cornell University, **Polytec, ***US Army Research Laboratory (abstract 1467)

Finalist #4.1 Florian Thalmayr, Ken-ya Hashimoto, Tatsuya Omori, Masatsune Yamaguchi
“Fast Evaluation of Lamb Wave Scattering by Time Harmonic FEM simulation”
Graduate School of Engineering, Chiba University (abstract 113)

Finalist #4.2 *Mohamed Abd Allah, **Jyrki Kaitila, **Robert Thalhammer, **Werner Weber, *Doris Schmitt-Landsiedel
“Temperature Compensated Solidly Mounted BAW Resonators with Thin SiO₂ Layers”
*Lehrstuhl für Technische Elektronik, Technische Universität München, **Infineon Technologies (abstract 191)
Finalist #4.3 *Eduard Rocas, *Carlos Collado, **Enrique Iborra, ***Robert Aigner
“Unified model for nonlinear effects in BAW resonators”
*Signal Theory and Communications, Universitat Politècnica de Catalunya, **Grupo de Microsistemas y Materiales Electrónicos, Universidad Politécnica de Madrid, ***R&D Acoustic Technologies, Triquint Semiconductor (abstract 703)

Finalist #4.4 Bennett Meulendyk, Mauricio Pereira da Cunha
“Suppression of transverse waveguide modes for SAW resonators with Pt and Pt/Rh/ZrO2 electrodes”
Electrical and Computer Engineering, University of Maine (abstract 1015)

GROUP 5 - Transducers & Transducer Materials

Finalist #5.1 *Alper Sisman, **Jaime Zahorian, **Gokce Gurun, *Mustafa Karaman, **Mujdat Balantekin, **F. Levent Degertekin, **Paul Hasler
“Evaluation of CMUT Annular Arrays for Side-looking IVUS”
*Isik University, Electronics Eng. Dep., **Georgia Institute of Technology (abstract 1218)

Finalist #5.2 Matthew Eames, John Hossack
“Selectable Frequency CMUT with Membrane Stand-Off Structures”
University of Virginia (abstract 1186)

Finalist #5.3 Joseph Kilroy, Linsey C. Phillips, Abhay V. Patil, John Hossack
“Ultrasound Catheter for Microbubble Based Drug Delivery”
Biomedical Engineering, University of Virginia (abstract 920)
## Organizing Committee

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<thead>
<tr>
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2009 IEEE International Ultrasonics Symposium

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Yes Events, Baltimore Maryland, USA- for online conference registration

Hyatt Regency O’Hare- Rosemont, Illinois, USA June 13-14, 2009 for the 3rd TPC meeting of the 2009 IEEE IUS in Chicago, IL

Industrial Measurement Systems, Inc. Aurora, Illinois, USA, president, Donald E. Yuhas and staff for sending blast emails for publicity and calls for papers, TPC meeting arrangements.
Numerous members of the organizing committee have contributed to this program and program book. A special thanks to Ms Loretta Oleksak and Ms. Carol L. Vorres for their valuable contributions.

2010 IEEE International Ultrasonics Symposium
San Diego, CA USA  October 11-14, 2010
General Chair: Bob Potter; E-mail: bpotter@vectron.com
The technical program is arranged as follows:

- Oral Sessions, Monday, September 21, 2009
- Poster Sessions, Monday, September 21, 2009
- Oral Sessions, Tuesday, September 22, 2009
- Poster Sessions, Tuesday, September 22, 2009
- Oral Sessions, Wednesday, September 23, 2009
- Poster Sessions, Wednesday, September 23, 2009
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<td><strong>Ferroelectrets and Other Transducer Materials</strong></td>
<td><strong>Microfluidic Manipulation</strong></td>
<td><strong>SAW Applications</strong></td>
<td><strong>Phononic Crystals - Fundamentals</strong></td>
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**Session 1A.**

Molecular Imaging Using Contrast Ultrasound

Alexander L Klibanov1, Talent Shevchenko2, Sunil Unnikrishnan2, Muzaffer Celebi2, Annemieke van Wamel3, Joshua Rychak4, Christopher Anderson4, Balasundar Raju5, Chien Ting Chin5, Michael Lawrence2, John Hossack2, Klaus Ley6,

1University of Virginia, USA; 2University of Virginia, USA; 3Erasmus Medical Center, Rotterdam, Netherlands; 4Targesen Inc, USA; 5Philips Research, USA; 6La Jolla Institute of Allergy and Immunology, USA

**Session 2A.**

Estimation of Skin Elasticity by Measuring Surface Wave Velocity Under Impulse Stimulus

Bo Qiang1, Xiaoming Zhang1, James Greenleaf1,

1Mayo Clinic College of Medicine, USA

**Session 3A.**

High Temperature Piezoelectric Properties of CaBi2Ta2O9 Ceramics

Tadashi Takenaka1, Toji Tokutsu1, Yuji Hiruma1, Hajime Nagata1,

1Tokyo University of Science, Japan

**Session 4A.**

Novel Integrated System of Sensor and Actuator for Droplets on Sensor Plate/matching Layer/piezoelectric Substrate Structure

Jun Kondoh1, Noriyuki Yasuda2, Mitsunori Sugimoto3,

1Shizuoka University, Graduate School of Science and Technology, Japan; 2Shizuoka University, Graduate School of Engineering, Japan; 3Shizuoka University, Research Institute of Electronics, Japan

**Session 5A.**

Rayleigh-Mode Spurious Analysis for Non-Flat SiO2/Al/LiNbO3 Structure by Using FEM/SDA

Hiroyuki Nakamura1, Rei Goto1, Hidekazu Nakanishi1, Koji Seo1, Ken-ya Hashimoto2, Masatsune Yamaguchi2,

1Panasonic Electronic Devices Co., Ltd., Japan; 2Chiba University, Japan

**Session 6A.**

Elastic Waves in a 3D Unconsolidated Granular Phononic Crystal with Rotating Particles

Aurélien Merkel1, Vitalyi Gusev2, Vincent Tournat1,

1Université du Maine, LAUM, France; 2Université du Maine, LPEC, France
<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>12:00 pm</td>
<td><strong>MONDAY ORAL</strong></td>
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<tr>
<td></td>
<td>1. Intravascular Ultrasound Detection and Intracellular Molecularly Targeted Microbubbles for Gene Delivery</td>
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<td>2. Accurate Assessment of Middle Ear Cholesterol with Real-Time Imaging Reflections from a Transysmic Membrane</td>
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<td>3. Broadband Ferroelectric Transducers</td>
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<td>4. Inducing Rapid Fluid Flow in Microchannels with Surface Acoustic Waves</td>
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<td>5. Ultrasonic Waves Between a Band Gap of a 1D Periodic Structure Using Surface Acoustic Waves</td>
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<td>6. Nanoparticle-Exposed Pathofluidic Droplets for Imaging and Therapy</td>
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<td>7. SWV Imaging - A Real Time Dual-Frequency Ultrasound System</td>
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<td>8. The Alignment of Multimodal Particles in Fluidic Systems Using Surface Acoustic Waves</td>
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<td>9. Radiation Force-Enhanced Targeted Imaging Using a Dual-Frequency High-Resolution Transducer</td>
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<td>10. Real-Time Imaging with the Sonic Window: A Plated-Grid C-Sensor, Medical Ultrasound Device</td>
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<td>11. Ferroelectric Sensor Arrays for Characterization of Cavitation Effects in Ultrasonic Cleaning</td>
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<td>12. The Effect of Radiation Force on Sonoluminescence and Specificity of Bioactive Microbubbles with a Non-Oriented Ultrasound Transducer</td>
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<td>13. Fiber Optic Broadband Ultrasonic Probe for Virtual Biopsy: Technological Evaluation</td>
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<td>14. CMOI Compatible/A inversion Ferroelectric Microbubbles</td>
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<td>15. Very Low Amplitude B/W Filter for Ultrasonic Imaging Using CMOS and LED</td>
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**MONDAY ORAL**

September 20-23, 2009

**Rome, Italy**
### 2:30 pm – 4:00 pm

<table>
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<th>Sala 1</th>
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<th>Sala 4</th>
<th>Tarragona</th>
<th>Pergamo</th>
<th>Baalbek</th>
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| **Session 1B.** **Contrast Agents and Sonoporation**  
Chair: Paul Dayton  
Univ. North Carolina/NCSU | **Session 2B.** **Therapy Monitoring, Control, and Quality Assurance**  
Chair: Emed Ebbini  
Univ. of Minnesota | **Session 3B.** **Transducers & Ultrasound Modeling**  
Chair: Yongrue Roh  
Kyungpook University | **Session 4B.** **Advances in NDE**  
Chair: David Greve  
Carnegie Mellon University | **Session 5B.** **SAW Modeling**  
Chair: Karl Wagner  
EPCOS AG | **Session 6B.** **Visualization Interferometry**  
Chair: John D. Larson  
Avano Technologies |
| 2:30 pm  
1B-1: Incorporation of Endothelial Cells with CDS-Targeted Microbubbles at Low Acoustic Pressures  
Nikola Kostarev, Bin Fang, Ramesh Nadendla,  
Univ. of North Carolina, Biomedical Engineering  
North Carolina State University | 2B-1: MR Guidance, Monitoring and Control of Brain HIFU Therapy to Brain Abscesses: In Vivo Demonstration in Rats at 7 T  
Brigid Enright, Mathias Genemuid, Eric Delattre,  
University of Minnesota, Biomedical Engineering  
North Carolina State University | 3B-1: Design of a High Intensity Focused Ultrasound Multi-Element Phased Array Transducer for Transcortical Treatment of Liver Tumors  
Pierre Gelat, Ian Rivens, Gail ter Haar  
National Physical Laboratory, Quality of Life Division  
University of Strathclyde, Centre for Ultrasonic Engineering  
United Kingdom | 4B-1: EMAT’s and Its Potential for Modern NDE – State of the Art and Latest Applications  
Gudrun Bruckner, Gernot Stampf, Georg Franz  
Carinthian Tech Research AG  
Carinthian University of Applied Sciences  
Austria | 5B-1: SAW Brain Sensitivity of Selected Rayleigh Wave Crystal Cuts  
Hans-Juergen Salzburger  
Fraunhofer IzFP  
Germany | 6B-1: Imaging Surface Acoustic Waves on Phononic Crystal Devices  
Paul Otsuka, Sorasak Danworaphong,  
Hokkaido University, Graduate School of Engineering  
Korea  
Japan |
| 2:45 pm  
1B-2: Ultrasound-Mediated Endothelial Cell Permeability Changes with Targeted Contrast Agents  
Pavlos Anastasiadis, John S. Allen  
University of Hawaii at Manoa, Mechanical Engineering  
USA | 2B-2: Realtime Two Dimensional Temperature Imaging Using Ultrasound  
B. L. Kingsley, E. B. J. Brown  
University of Strathclyde, Centre for Ultrasonic Engineering  
United Kingdom | 3B-2: Apertured and Deterministic 2D Phased Array Structures for Ultrasonic Imaging  
Ashish Srivastava, Gaurav Ramamurthy,  
Naval Research Laboratory  
USA | 4B-2: Real-Time Simulations and Experiments on Ultrahigh Frequency Surface Acoustic Waves in Microstructured Phononic Crystals  
Istvan A. Veres, Dieter M. Profunser,  
University of Strathclyde, Dept of Electronic & Electrical Engineering  
University of Strathclyde, Centre for Ultrasonic Engineering  
United Kingdom  
Japan | 5B-2: SAW Device Design Using the Nelder-Mead Minimisation Algorithm  
David Morgan  
Impulse Consulting  
United Kingdom | 6B-2: Real-Time Simulations and Experiments on Ultrahigh Frequency Surface Acoustic Waves in Microstructured Phononic Crystals  
Istvan A. Veres, Dieter M. Profunser,  
University of Strathclyde, Dept of Electronic & Electrical Engineering  
University of Strathclyde, Centre for Ultrasonic Engineering  
United Kingdom  
Japan |
MONDAY ORAL

4:30 pm – 6:00 pm

Session 1C.
New Methods and High Frequency Ultrasound
for Tissue Characterization
Chair: Georg Schmitz
Ruhr-Universität Bochum

Session 2C.
Therapeutic In-Vivo Studies
Chair: Elisa Konofagou
Columbia Univ.

Session 3C.
CMUT Modeling
Chair: Jian Yuan
Boston Scientific

Session 4C.
Acoustic Wave Sensors
Chair: Donald McCann
University of Maine

Session 5C.
BAW I
Chair: Ken Lakin
Consultant

Session 6C.
Novel Ultrasonic Motors I
Chair: Eun Suk Kim
University of Southern California

4:30 pm

Sala 1

201 Acoustic Microscopy – Beyond High Resolution Imaging

202 In-Vivo Study of Non-Invasive Therapeutics by Monitoring in a Punchin Model

203 Non-Linear Dynamic Response of Nanosystem Films Using Love Wave Sensors

Sala 2

211 Young's Modulus Characterization of Nanosystem Tissue Films Using Love Wave Sensors

212 Measurement of Methanol Solutions Using Love Mode Liquid Sensor

Sala 4

221 Brain Region and Microbubble-Size Dependence of the Focused Ultrasound-Induced Blood-Brain Barrier Opening in Mice in Vivo

222 Minimizing the Bottom Reflections in Ultrasonic CMUT Transducer Backing Using Low Profile Structuring

Tarragona

231 AFM Study of 2.0 x 2.5 mm**2 UMTS FBAR Duplexers Based on 8-Pole Elliptic Filters

232 An Electrically Driven Acoustic Resonator Imaged with an Ultrafast Optical Technique

Pergamo

241 Increase in Torque of Screw-Shaped Ultrasonic Motor

Baalbek

251 Increase in Torque of Screw-Shaped Ultrasonic Motor

261 Increase in Torque of Screw-Shaped Ultrasonic Motor
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Institute of Electrical and Electronic Engineers

10:00 am – 11:30 am

Session P1-F

Chair: David Evans
University of Lancaster

Blood Flow II

MONDAY POSTER

Sala Orange

2009 IEEE International Ultrasonics Symposium
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### Session P1-L: Phononic Crystals-Band Structure and Propagation

**Chair:** Ray Obsson  
**Sanda National Laboratory**

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### Session P1-K: Signal Processing and Imaging

**Chair:** Erdal Oruklu  
**Illinois Institute of Technology**

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### Session P1-O: Thin Films-Growth and Characterization

**Chair:** Nobutomo Nakamura  
**Osaka University**

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### Session P1-N: Micro-nano Structures and Propagation

**Chair:** Yonsei H. Lee  
**Seoul National University**

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### Session P1-P: Materials and Applications

**Chair:** Tom Fabritius, Joona Eskelinen  
**Electrical and Computer Engineering, USA**

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Chair: Akimasa Suzuki
Tokyo Institute of Technology

P1-P-01 Experimental Considerations of High Frequency Ultrasonic Atomization Using SAW Devices
Yoon-Seok Jang1, Hyunho Kim2, Seян-Hee Kang3; 1Seoul National University, Korea, Republic of; 2Korea Electronics Technology Institute, Korea, Republic of; 3Korea University, Republic of Korea

P1-P-02 Study of Traction and Initiation of Adhesion Layers for P(S,S)-High Temperature SAW Devices
Hiroshi Matsumoto1, Toshiro Takeuchi1, Shinya Hasegawa1, Takumi Takeike1, Masahiro Kimura1, Hiromichi Kikuchi1, Tomohide Nakamura1, Hiroshi Iwata1, Koichi Suzumori1, Takefumi Kanda1; 1Tokyo Institute of Technology, Japan

P1-P-03 Design and Characteristics of Novel Type Valveless Micro-Pump
Mizuno1; 1Okayama University, Japan

P1-P-04 Valveless Micro-Pump-

P1-P-05 Pneumatic Flow Control Valve Using Particle Actuators and Pumps

Chair: Jan H. Keppers
Sand X Inc.

P1-P-06 Computation of Time Delay in Detection Electronics for Fast Scanning ISM MHz ISM Band
Along Kang1, Along Kang2, Jiaotong University, China, People’s Republic of; 2Nanjing University of Science and Technology, China

P1-P-07 SAW Reflection from Surface Inhomogeneities with Frequency for Leaky Surface Acoustic Wave Transponders
Davide Vitali1, Giacomo Minale2, Martina Paolini3, Giovanni Maria Monteverde4; 1Università degli Studi di Bergamo, Italy, 2University of Rome Tor Vergata, Italy, 3University of Palermo, Italy, 4Nuclear Physics Institute, Czech Republic

Session PI-Q: Measurement & Yields

Chair: Jan H. Keppers
Sand X Inc.

P1-Q-01 Extraction of the P-Matrix’s Parameters Varied with Frequency for Leaky Surface Acoustic Wave
Bao Wang1, Zhonglei Wang2, Ming Li2, Xiaojing Shi2, Jianjun Zhang2; 1Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai, China, 2Shanghai Institute of Microsystem and Information Technology, Chinese Academy of Sciences, Shanghai, China

P1-Q-02 Computation of Plate Wave Dispersion in Diamond and Surface Wave Velocities Without Explicit Boundary Conditions
Yue Li1; 1University of Science and Technology of China, People’s Republic of China

P1-Q-03 Influence of Packaging Atmospheres on the Durability of High Temperature SAW Sensors
Nobuya Ikeda1, Yujiro Sato2, Toshiyuki Mita1; 1University of Electro-Communications, Japan, 2Hiroshima University, Japan

P1-Q-04 High Temperature Packaging for SAW Transponders
Davide Vitali1, Giacomo Minale2, Martina Paolini3, Giovanni Maria Monteverde4; 1Università degli Studi di Bergamo, Italy, 2University of Rome Tor Vergata, Italy, 3University of Palermo, Italy, 4Nuclear Physics Institute, Czech Republic

Session PI-U: Transducer Materials and Characterization

Chair: Ahmad Safafi
Rutgers

P1-U-01 Improvement of Selfmatched Phased Array for Crack Evaluation (SPACE) with LiNbO3 Single Crystal
Along Kang1, Along Kang2, Jiaotong University, China, People’s Republic of; 2Nanjing University of Science and Technology, China

P1-U-02 Study of SAW Transducer Materials for GHz Cracking Applications
Kunihiko Tanaka1, Tsukasa Shindo1, Takaya Tomita1, Naoyuki Kubo1, Hidehiro Ohishi1; 1University of ElectroCommunications, Japan

P1-U-03 Compensation of Time Delay in Detection Electronics for Fast Scanning ISM MHz ISM Band
Along Kang1, Along Kang2, Jiaotong University, China, People’s Republic of; 2Nanjing University of Science and Technology, China

P1-U-04 Influence of Packaging Atmospheres on the Durability of High Temperature SAW Sensors
Nobuya Ikeda1, Yujiro Sato2, Toshiyuki Mita1; 1University of Electro-Communications, Japan, 2Hiroshima University, Japan

P1-U-05 In-Plane Propagation Properties of Different Gold/GeNi Metallizations in Intensified Selfmatched Phased Array Transducer
Masakazu Fujino1, Nobuyuki Nakamura1, Hiroyuki Kojima1; 1Fukuoka University, Japan
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<td>P1-U-23</td>
<td>Preparation of Piezoelectric Ceramic Fibers, Sprays, and Pasting Shells for Transducer Applications Using a Novel Alginate Gelation Method</td>
<td>Sedat Alkoy, Cem Gol, Emre Tekel</td>
<td>Gebze Institute of Technology, Turkey</td>
</tr>
<tr>
<td>P1-U-24</td>
<td>Multi-Modal and Uni-Modal Functionally Graded Piezoelectric Ultrasonic Transducers</td>
<td>Wilfredo Montealegre Rubio, Anastasia Rybyanets, Maria Lugovaya</td>
<td>Institute of Electrical and Electronic Engineers, France</td>
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</tbody>
</table>

**Notes:**
- Posters are listed in ascending order of their poster numbers.
- Institutions are listed in a standardized format for clarity.
- Authors' names and affiliations are provided for each poster.
| Session 1D. | Clinical Ultrasound | Chair: Ton van der Steen, Erasmus Medical Centre |
| Session 2D. | High Frequency Ultrasound and its Applications | Chair: Stuart Foster, Univ. of Toronto |
| Session 3D. | Elastography | Chair: Timothy Hall, Univ. of Wisconsin-Madison |
| Session 4D. | Flow Sensing | Chair: Marie Kupnik, Stanford University |
| Session 5D. | Oscillators and Temperature Compensation | Chair: Jan H. Kuypers, Sand 9, Inc. |
| Session 6D. | Bulk Wave Effects and Devices | Chair: Bikash Sinha, Schlumberger-Doll Research |

<table>
<thead>
<tr>
<th>Sala 1</th>
<th>Sala 2</th>
<th>Sala 4</th>
<th>Tarragona</th>
<th>Pergamo</th>
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<td>David Cosgrove, Imperial College, United Kingdom</td>
<td>Zahir Torbatian, Dalhousie University, Biomedical Engineering, Canada</td>
<td>Jingfeng Jiang, University of Wisconsin, Medical Physics, USA</td>
<td>Bernd Neubig, Axtal Consulting, Lab MOS, Germany</td>
<td>Takahiko Yanagitani, Nagoya Institute of Technology, Graduate School of Engineering, Japan</td>
<td>Yook-Kong Yong, Rutgers University, Civil and Environmental Engineering, USA</td>
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<td>D-2 High Frame Rate Mouse Embryo Cardiac Imaging Using Doppler Derived Gating</td>
<td>D-2 BiPlane Ultrasound Strain Imaging During Induced Contraction of Skeletal Muscles</td>
<td>D-3 Torsional Acoustic Waveguide Sensor</td>
<td>D-3 Eigen-Frequency and Frequency Response Calculation of Piezoelectric Resonator Parameters</td>
<td>Orlando Aristizabal, Skirball Institute, NYU School of Medicine, USA</td>
<td>Yochi K. Yang, Doshisha University, Laboratory of Ultrasonic Electronics, Japan</td>
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<td>Orlando Aristizabal, Skirball Institute, NYU School of Medicine, USA</td>
<td>Orlando Aristizabal, Skirball Institute, NYU School of Medicine, USA</td>
<td>William Spratt, University of Maine, USA</td>
<td>Yochi K. Yang, Doshisha University, Laboratory of Ultrasonic Electronics, Japan</td>
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<td>8:30 am</td>
<td>2D-2</td>
<td>Cardiovascular Ultrasound Imaging to assess Blood Flow Dynamics</td>
<td>Rome, Italy</td>
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<td>8:45 am</td>
<td>2D-3</td>
<td>Current Sonographic Imaging in Obstetrics</td>
<td>Stockholm, Sweden</td>
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<tr>
<td>9:00 am</td>
<td>2D-4</td>
<td>Spectral Analysis of Ultrasound Backscatter for Characterization of HP \</td>
<td>Erasmus University Medical Centre, Department of Obstetrics, Netherlands</td>
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<tr>
<td>9:15 am</td>
<td>2D-5</td>
<td>Percutaneous Ultrasound for Early Detection of Myocardial Injury</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>9:30 am</td>
<td>2D-6</td>
<td>Ultrasound-Based 3D Strain Estimation of the Gestational Age</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>9:45 am</td>
<td>2D-7</td>
<td>Dynamic Response of Water Droplets</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>10:00 am</td>
<td>2D-8</td>
<td>IC-Compatible Power Oscillators Using Thin Film Resonator</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>10:15 am</td>
<td>2D-9</td>
<td>Understanding Third Order Non-Linear Behavior in BAW Devices</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>10:30 am</td>
<td>2D-10</td>
<td>Current Sonographic Imaging in Gynecology</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>10:45 am</td>
<td>2D-11</td>
<td>Spectral Analysis of Ultrasound Backscatter for Characterization of HP</td>
<td>Department of Obstetrics, Netherlands</td>
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<tr>
<td>11:00 am</td>
<td>2D-12</td>
<td>Perfusion Ultrasound for Early Detection of Myocardial Injury</td>
<td>Department of Obstetrics, Netherlands</td>
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<td>11:15 am</td>
<td>2D-13</td>
<td>Ultrasound-Based 3D Strain Estimation of the Gestational Age</td>
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<td>Dynamic Response of Water Droplets</td>
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<td>11:45 am</td>
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<td>12:00 am</td>
<td>2D-16</td>
<td>Understanding Third Order Non-Linear Behavior in BAW Devices</td>
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<td>12:15 pm</td>
<td>2D-17</td>
<td>Current Sonographic Imaging in Gynecology</td>
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<td>12:30 pm</td>
<td>2D-18</td>
<td>Spectral Analysis of Ultrasound Backscatter for Characterization of HP</td>
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<td>12:45 pm</td>
<td>2D-19</td>
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<td>1:00 pm</td>
<td>2D-20</td>
<td>Ultrasound-Based 3D Strain Estimation of the Gestational Age</td>
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<td>1:15 pm</td>
<td>2D-21</td>
<td>Dynamic Response of Water Droplets</td>
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<tr>
<td>1:30 pm</td>
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<td>IC-Compatible Power Oscillators Using Thin Film Resonator</td>
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<tr>
<td>1:45 pm</td>
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<td>Understanding Third Order Non-Linear Behavior in BAW Devices</td>
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<td>2:00 pm</td>
<td>2D-24</td>
<td>Current Sonographic Imaging in Gynecology</td>
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<td>2:15 pm</td>
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<td>Spectral Analysis of Ultrasound Backscatter for Characterization of HP</td>
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<td>2:30 pm</td>
<td>2D-26</td>
<td>Perfusion Ultrasound for Early Detection of Myocardial Injury</td>
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### Oral --- Tuesday, September 22, 2009

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<th>Therapeutic Arrays</th>
<th>Session 2E.</th>
<th>Microbubbles: Characterization and Modeling</th>
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<tr>
<td>Chair:</td>
<td>Mathias Fink</td>
<td>Chair:</td>
<td>Ayache Bouakaz</td>
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<td>ESPCI - France</td>
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<th>Session 3E.</th>
<th>Elasticography Methods</th>
<th>Session 4E.</th>
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<tr>
<td>Chair:</td>
<td>Mickael Tanter</td>
<td>Chair:</td>
<td>Massimo Pappalardo</td>
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<th>Session 5E.</th>
<th>BAW II</th>
<th>Session 6E.</th>
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<tr>
<td>Chair:</td>
<td>Gernot Fattinger</td>
<td>Chair:</td>
<td>Takefumi Kanda</td>
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<td>Triquint Semiconductor</td>
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<td>Okayama University, Japan</td>
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</table>

### Session 1E. (11:30 am - 12:00 pm)

**Energy Based Adaptive Focusing: Optimal Ultrasonic Focusing Using Radiation Force Magnetic Resonance Guidance**
- Benoit Larrat
- Mathieu Pernot
- Gabriel Montaldo
- Mathias Fink
- Mickael Tanter
- Univ Paris 7, CNRS UMR 7587, Institut Langevin - ESPCI Paristech, France

### Session 2E. (11:30 am - 12:00 pm)

**Characterization of Viscoelastic Properties of Ultrasound Contrast Agents**
- Hélène Moreschi
- Anthony Novell
- Samuel Callé
- Marielle Defontaine
- Ayache Bouakaz
- INSERM U930 CNRS ERL 3106 F.Rabelais University, France, Metropolitan

### Session 3E. (11:30 am - 12:00 pm)

**Electromechanical Wave Imaging: Non-Invasive Localization and Quantification of Partial Ischemic Regions in Vivo**
- Jean Provost
- Wei-Ning Lee
- Kana Fujikura
- Elisa E. Konofagou
- Columbia University, Biomedical Engineering, Vanderbilt Clinic Columbia University, USA; Columbia University, Biomedical Engineering, USA; Columbia University, Radiology, USA

### Session 4E. (11:30 am - 12:00 pm)

**Flexible Ultrasonic Transducers for Structural Health Monitoring of Pipes at High Temperatures**
- Jeanne-Louise Shih
- Makiko Kobayashi
- Cheng-Kuei Jen
- McGill University, Canada; Industrial Materials Institute National Research Council, Canada

### Session 5E. (11:30 am - 12:00 pm)

**Improved Coupled Resonator Filter Performance Using Carbon-Doped Oxide Decoupling Layer**
- Stephen Gilbert
- Phil Nikkel
- Rich Ruby
- Tiberiu Jamneala
- John Larson III
- Avago Technologies, Wireless Semiconductor Division, USA

### Session 6E. (11:30 am - 12:00 pm)

**Ultrasonic Linear Motor Using Traveling Surface Acoustic Waves**
- Minoru Kurosawa
- Tokyo Institute of Technology, Department of Information Processing, Japan

### Session 1E. (11:45 am - 12:15 pm)

**Adaptive Transferrin-Mediated Targeting Using Dual-Mode Ultrasound Arrays: A Simulation and Experimental Study**
- Andrew Casper
- John Ballard
- Emad Ebbini
- University of Minnesota, Electrical and Computer Engineering, USA; University of Minnesota, Electrical and Computer Engineering, USA

### Session 2E. (11:45 am - 12:15 pm)

**Theoretical and Experimental Validation of Enhanced Subharmonic Behavior of Phospholipid-Coated Ultrasound Contrast Agents**
- Jeroen Sijl
- Benjamin Dollet
- Marlies Overvelde
- Timo Rozendal
- Nico de Jong
- Detlef Lohse
- Michel Versluis
- University of Twente, Physics of Fluids Group, Netherlands; Université Rennes 1, Groupe de Matière Condensée et Matériaux, France

### Session 3E. (11:45 am - 12:15 pm)

**Quantitative Surface Wave Method for Measuring Local Viscoelasticity of Lungs**
- Xiaoming Zhang
- Bo Qiang
- Matthew Urban
- Randall Kinnick
- James Greenleaf
- Mayo Clinic, Physiology and Biomedical Engineering, USA; Mayo Clinic, Pulmonary and Critical Care, USA

### Session 4E. (11:45 am - 12:15 pm)

**Direction of Arrival Estimation of Multimodal Lamb Waves Using 2-D Arrays**
- Tadeusz Stepinski
- Marcus Engholm
- Uppsala University, Signals and Systems, Sweden; Uppsala University, Signals and Systems, Sweden

### Session 5E. (11:45 am - 12:15 pm)

**GPS and WiFi Single Ended to Differential CRF Filters Using SiOCH as a De-Coupling Layer**
- Rich Ruby
- Steve Gilbert
- Allen Chien
- Tiberiu Jamneala
- Avago Technologies, USA
| Session 1F. Therapeutic Applications |
| Chair: Charles Cain |
| Uni. of Michigan |

| Session 2F. Contrast Agent Imaging |
| Chair: Nico de Jong |
| Erasmus Medical Centre |

| Session 3F. Cardiac Imaging |
| Chair: James Miller |
| Washington University |

| Session 4F. NDE Signal Processing |
| Chair: Eric Furgason |
| Purdue University |

| Session 5F. SAW Device Design |
| Chair: Leo Reindl |
| University of Freiburg |

| Session 6F. Phononic Crystals-Propagation |
| Chair: Vincent Laude |
| CNRS |

2:30 pm – 4:00 pm
Oral --- Tuesday, September 22, 2009
Sala 1

### 2:30 pm
1F-1 Kidney Stone Fragmentation Using Histotripsy
Alexander Duryea, Adam Maxwell, William Roberts, Zhaolai Chen, Charles Cain, University of Michigan, Biomedical Engineering, USA

1F-2 Ultrafast Imaging of Ultrasound Contrast Agents
Olivier Couture, Souad Bannouf, Gabriel Montaldo, Jean-Francois Aubry, Mathias Fink, ESPCI ParisTech, Paris, France

1F-3 Tangential SoundField Oscillations for 3D Motion Ultrasonic Echocardiography
Hervé Liebgott, Abderraouf Ben Salem, Adrian Basarab, Hang Gao, Piet Claus, Philippe Delachartre, Denis Friboulet, CREATIS-LRMN, France

1F-4 Three Dimensional Ultrasound General Interface
Maximilian Pitschi, Jürgen Kiwitt, Robert Koch, Karl Wagner, Robert Weigel, EPCOS AG, Munich, Germany

2:30 pm
Sala 2

### 2:45 pm
1F-2 Moving Stones Inside a Kidney Using Acoustic Radiation Force
Oleg Sapozhnikov, Michael Bailey, Bryan Cunitz, Peter Kaczkowski, University of Washington, Applied Physics Laboratory, USA

1F-3 High Resolution In Vivo Ultrasonic Contrast Imaging Using a Dual-Frequency Transducer
Brett Byram, Greg Holley, Daniel Need, Gregg Trahey, Duke University, Biomedical Engineering, USA

1F-4 Adaptive 3D Ultrasonic Data Compression Using Distributed Processing Engines
Christophe Desmouliers, Erdal Oruklu, Jafar Saniie, Illinois Institute of Technology, Electrical and Computer Engineering, USA

2:45 pm
Sala 4

### 2:30 pm
2F-1 Three Dimensional Ultrasound General Interface
Maximilian Pitschi, Jürgen Kiwitt, Robert Koch, Karl Wagner, Robert Weigel, EPCOS AG, Munich, Germany

2F-2 High-Resolution In Vivo Ultrasonic Contrast Imaging Using a Dual-Frequency Transducer
Brett Byram, Greg Holley, Daniel Need, Gregg Trahey, Duke University, Biomedical Engineering, USA

2F-3 2D Motion Tracking Using Raw Data and a Matrix Array: Phantom and In Vivo Cardiac Studies
Brett Byram, Greg Holley, Duke University, Biomedical Engineering, USA

2F-4 Band Gap of Lamb Waves in One-Dimensional Phononic Crystal Plate
Yong Li, Zhilin Hou, Badreddine Assouar, South China University of Technology, People’s Republic of China, People’s Republic of China

Sala 3

### 2:30 pm
3F-1 Moving Stones Inside a Kidney Using Acoustic Radiation Force
Oleg Sapozhnikov, Michael Bailey, Bryan Cunitz, Peter Kaczkowski, University of Washington, Applied Physics Laboratory, USA

3F-2 High Resolution In Vivo Ultrasonic Contrast Imaging Using a Dual-Frequency Transducer
Brett Byram, Greg Holley, Daniel Need, Gregg Trahey, Duke University, Biomedical Engineering, USA

3F-3 2D Motion Tracking Using Raw Data and a Matrix Array: Phantom and In Vivo Cardiac Studies
Brett Byram, Greg Holley, Duke University, Biomedical Engineering, USA

3F-4 Adaptive 3D Ultrasonic Data Compression Using Distributed Processing Engines
Christophe Desmouliers, Erdal Oruklu, Jafar Saniie, Illinois Institute of Technology, Electrical and Computer Engineering, USA

Sala 5

### 2:30 pm
4F-1 Three Dimensional Ultrasound General Interface
Maximilian Pitschi, Jürgen Kiwitt, Robert Koch, Karl Wagner, Robert Weigel, EPCOS AG, Munich, Germany

4F-2 High-Resolution In Vivo Ultrasonic Contrast Imaging Using a Dual-Frequency Transducer
Brett Byram, Greg Holley, Daniel Need, Gregg Trahey, Duke University, Biomedical Engineering, USA

4F-3 2D Motion Tracking Using Raw Data and a Matrix Array: Phantom and In Vivo Cardiac Studies
Brett Byram, Greg Holley, Duke University, Biomedical Engineering, USA

4F-4 Adaptive 3D Ultrasonic Data Compression Using Distributed Processing Engines
Christophe Desmouliers, Erdal Oruklu, Jafar Saniie, Illinois Institute of Technology, Electrical and Computer Engineering, USA
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<th>Time</th>
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<td>3:00 pm</td>
<td>Introduction and Welcome</td>
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<tr>
<td>3:15 pm</td>
<td>Resonant Pressure Sensor for Measuring Blood Flow and Flow Velocities at Cell Resolution</td>
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<td>3:30 pm</td>
<td>Propagation of Acoustic Waves in Complex Dielectric-Loaded Porous Media</td>
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<td>3:45 pm</td>
<td>Phononic Crystals with a Point Defect and Gaps Wider Than a Quarter Pitch Width</td>
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**4:30 pm – 6:00 pm**

**Oral — Tuesday, September 22, 2009**

**Session 1G: Therapy Microbubbles**
Chair: Kallervo Hynynen, Univ. of Toronto

**Session 2G: Tissue Characterization**
Chair: Michael Kallos, Ryerson University

**Session 3G: Cancer Imaging**
Chair: John Hassack, Univ. of Virginia

**Session 4G: Nanoscale Acoustic Sensing**
Chair: John Vetelino, University of Virginia

**Session 5G: Novel SAW Materials and Structures**
Chair: Mauricio Pereira da Cunha, University of Maine

**Session 6G: High Frequency Transducers & Arrays**
Chair: Geoff Lockwood, Queen’s University

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**4:30 pm**
1. **Oral 1.1** Change of Cell Membrane Permeability by Controlled Microbubble Visualization
   - Yoon-Bin Jeong, Hyoung K. Kim, Chul Ung
   - University of Michigan, USA

2. **Oral 1.2** Acoustic Emissions Associated with Ultrasound-Mediated Microbubble Destruction of Tumor Blood Flow
   - David Smith, J. Nicholas, John Hynynen, Kallervo Hynynen
   - National Institute of Standards and Technology, USA

**4:45 pm**
3. **Oral 1.3** Estimating Scattering Properties in Real Phantoms Using Nonlinear Mathematical Form Factors
   - Zachary T. Hafez, Jing Yong Ye, Cheri Sala, Raffi Karshafian, Kullervo Hynynen, John Madden
   - Sunnybrook Health Sciences Centre, Canada; 3University of Toronto, Dept. of Medical Biophysics, Canada

4. **Oral 1.4** Performance of Three-Dimensional Acoustical Imaging in Prostate Cancer Detection: A Comparison Between In Vivo and In Vitro Experiments
   - Benjamin Karshafian, Laura Zhou, John Madden, John Hossack, John Madden
   - Sunnybrook Health Sciences Centre, Canada; 3University of Toronto, Dept. of Medical Biophysics, Canada

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**Session 2G: Tissue Characterization**
Chair: Michael Kallos, Ryerson University

**Session 3G: Cancer Imaging**
Chair: John Hassack, Univ. of Virginia

**Session 4G: Nanoscale Acoustic Sensing**
Chair: John Vetelino, University of Virginia

**Session 5G: Novel SAW Materials and Structures**
Chair: Mauricio Pereira da Cunha, University of Maine

**Session 6G: High Frequency Transducers & Arrays**
Chair: Geoff Lockwood, Queen’s University
5:00 pm

Ultrasonics, Ferroelectrics, and Frequency Control Society

5:15 pm

5:30 pm

5:45 pm

TUESDAY ORAL
Session P2-B. Therapy Microbubbles
Chair: Greg Clement
Harvard Medical School

Session P2-C. Contrast Agents: Characterization and Modeling
Chair: Christopher Hall
Philips Research North America

TUESDAY POSTER
### Session P2-A

**Title:** Measurement of Granule Strength in Particle Beds Using Ultrasonic Velocimetry  
**Authors:** Peter Coghill1, Swee Leong Kok1

**Abstract:** The measurement of granule strength in particle beds using ultrasonic velocimetry is presented. This technique allows for the determination of granule strength without the need for direct contact, which is advantageous in certain applications. The methodology and results of the study are discussed in detail.

### Session P2-B

**Title:** Characterization of Granular Media Undergoing Compaction  
**Authors:** Legland Jean-Baptiste1, Granular Media Undergoing Compaction

**Abstract:** The characterization of granular media undergoing compaction is explored in this session. The focus is on understanding the mechanical behavior and structural changes of granular materials under varying compaction conditions. The presentation includes experimental setups and analysis techniques to better understand the compaction process.

### Session P2-C

**Title:** Ultrasonic Characterization of Unconsolidated Granular Media Undergoing Compaction  
**Authors:** Yingyao Jia1

**Abstract:** This session discusses the ultrasonic characterization of unconsolidated granular media undergoing compaction. The aim is to investigate the dynamic properties and structural changes of granular materials using ultrasonic methods. The session covers the methodologies and findings from recent research.

### Session P2-D

**Title:** Ultrasonic Characterization of Bulk Acoustic Wave Transducers and Resonators Based on Low Temperature Sputtered Thin Films  
**Authors:** Gianmarco Pinton1

**Abstract:** The focus of this session is on the ultrasonic characterization of bulk acoustic wave transducers and resonators. These components are essential in various applications, and the session explores the characterization techniques and performance metrics for devices based on low temperature sputtered thin films.

### Session P2-E

**Title:** Analysis of the Laser Surface Acoustic Wave Radiation for Symmetric and Non-symmetric Excitations  
**Authors:** Oleg Ryabushkin3, Aleksei Konyashkin2, Valentin Tyrtyshnyy1

**Abstract:** This session delves into the analysis of laser surface acoustic wave radiation, examining both symmetric and non-symmetric excitations. The presentation includes theoretical models and experimental results to understand the wave radiation characteristics under laser interaction.

### Session P2-F

**Title:** Ultrasonic Trapping of Beads in a Straight Vibrating Small Gap  
**Authors:** Aleksei Doronkin1, Elena Sorokina1, Alexei Vainer2, Yuri Rezvov3

**Abstract:** The trapping of beads in a straight vibrating small gap using ultrasonic waves is the subject of this session. The authors present their findings on the trapping mechanism and optimize conditions for efficient bead trapping.

### Session P2-G

**Title:** Efficient Ultrasonic Atomization Using a Vibrating Small Gap  
**Authors:** Mathias Fink1, Francois Coulouvrat2

**Abstract:** This session focuses on efficient ultrasonic atomization using a vibrating small gap. The presentation highlights the design and performance of atomizers employing this technique, emphasizing their potential applications in various industries.

### Session P2-H

**Title:** Non-linear and Von Neumann Reflection of Elastic Shock Waves in Soft Solids  
**Authors:** Yoshihiro Takada1, Kenta Tokumitsu1

**Abstract:** The study of non-linear and Von Neumann reflection of elastic shock waves in soft solids is the topic of this session. The authors discuss their experimental observations and theoretical predictions to advance the understanding of wave propagation in soft materials.

### Session P2-I

**Title:** Kinetics of the Nonlinear-Optical Crystal Analysis of the Leaky Surface Acoustic Wave Bubbles and Beads  
**Authors:** Chao Zhang1, Yiqiang Qin1, Gang Zhao2, Jiansong Liu1

**Abstract:** This session examines the kinetics of nonlinear-optical crystals, specifically focusing on the analysis of leaky surface acoustic wave bubbles and beads. The presentation covers the experimental methods and results to elucidate the dynamics of these phenomena.
<table>
<thead>
<tr>
<th>Session P2.4</th>
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<tr>
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<td>Determination of Tension in Continuously Woven Kevlar Flex-Weaves</td>
<td>J. Kesselring, G. Schrader, A. J. F. Stockel, W. W. Stockel, J. A. Stockel</td>
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**TUESDAY POSTER**
Session P2-N. Device Modeling
Chair: Jyrki Kašíla

TUESDAY POSTER
Session P2-R
Various Transducer Topics

Chair: Mark Schafer  Sonic Tech

P2-R-01: Feasibility Study of a Membrane-Type Magnetostrictive Acoustic Transducer for Ultrasonic Thrombolysis

Young Bum Chun, Hong Il Bae, Young Seok Kim  Korean Research Institute of Standards and Science, Korea

P2-R-04: Extension of CHOTs Technology to the Optical Generation and Detection of Very High Frequency Elastic Waves: Evanescent Cheap Optical Transducers (ECHOTS)

Ahmet Arca, Theodosia Stratoudaki, Richard J. Smith, Matt Clark, Mike Somekh  Nottingham University, Division of Electrical Systems and Optics, Faculty of Engineering, United Kingdom

P2-R-05: Linear Hydrophone Array for Measurement of Shock Wave Lithotripter Acoustic Fields

Jeffrey A. Ketterling, Paul Kim, Wayne Nelson, Michael B. Nylinder  Riverside Research Institute, Lizzi Center for Biomedical Engineering, USA

P2-R-02: Lowering the Center Frequency of Thick Film PZT Devices Using Acoustically Matched Backing Layers

Stephen Ellwood, Steven Freear  The University of Leeds, Ultrasound Group, School of Electronic and Electrical Engineering, United Kingdom

P2-R-03: Edge-Connected, Crossed-Electrode Array Using Non-Linear Transducer

Ichiro Fujishima, Yasutaka Tamura, Hirotaka Yanagida, Jyubei Tada, Tatuhisa Takahashi  Yamagata University, Informatics, Japan; Asahikawa Medical College, Mathematical Information Science, Japan
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<td>Phononic Crystals-Devices, Filters, Couplers</td>
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**2009 IEEE International Ultrasonics Symposium**

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<td>1. MR-Guided Ultrasound: Brain Tumor and Tissue Imaging Using a Headwear Wave-Grating Technique</td>
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<td>1. High Resolution Optoacoustic Imaging of the Rat Brain with Micro-Ultrasound</td>
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<td>9:00</td>
<td>1. Natural Brain Tissue Proton Density Mapping - a Pilot Study in Older Depressed Patients</td>
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<td>3. Integrating a Spatial Ultrasonic Measurement of Acoustic Source and Electronic Speckle Pattern Interferometry for Medical Applications</td>
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<td>4. 3D High Temperature Guided Acoustic Wave Transducer Array for Mechanical Gratings</td>
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**Wednesday Oral Session**

| 8:30  | 1. Freehand 3D Ultrasound Imaging of Intracerebral Hemorrhage Using a Headwear Wave-Grating Technique | Teerlinck, Jeffrey, Lui, C., LaVerriere, J., & Ehrlich, R. | University of California, San Francisco, USA                                |
| 8:45  | 1. Detection of Nanoparticles on Living Cells Using a Micro-Ultrasound | Bost, W., & Bost, W.                                              | Fraunhofer IBMT, Germany                                                   |
| 9:00  | 1. Fluid Properties Influence the Phase Velocity But Not the Attenuation Coefficient of Fluid-Filled Bone Between 0.55 and 2.5 MHz | Teerlinck, Jeffrey, Lui, C., LaVerriere, J., & Ehrlich, R. | University of California, San Francisco, USA                                |
| 9:15  | 1. Functional Imaging of the Rat Brain with Ultrasound | Benhadj-Salah, A., Bost, W., & Bost, W. | Fraunhofer IBMT, Germany                                                   |

**September 20-23, 2009**

Rome, Italy

**Ultrasonics, Ferroelectrics, and Frequency Control Society**
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<td>10:45 am</td>
<td><strong>Elasticity and Thermal Effects</strong>&lt;br&gt;Chair: Michael Insana&lt;br&gt;Univ. of Illinois at Urbana-Champaign</td>
<td><strong>Beamforming</strong>&lt;br&gt;Chair: Kai Thomenius&lt;br&gt;GE Global Research</td>
<td><strong>New Developments in Blood Flow Imaging</strong>&lt;br&gt;Chair: Jorgen Jensen&lt;br&gt;Technical Univ. of Denmark</td>
<td><strong>Energy Harvesting</strong>&lt;br&gt;Chair: Pierre Khuri-Yakub&lt;br&gt;Stanford University</td>
<td><strong>Piezoelectric Transducer Materials</strong>&lt;br&gt;Chair: Scott Smith&lt;br&gt;GE Global Research</td>
<td><strong>Acoustic Propagation</strong>&lt;br&gt;Chair: Georg Mansfeld&lt;br&gt;Institute of Radio Engineering &amp; Electronics/RAS</td>
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### Session 1I.
**Elasticity and Thermal Effects**

1. **Temperature Dependence of Shear Modulus in Ex Vivo Muscle Assessed by Ultrasound**<br>Emilie Sapin, Jean-Luc Gennisson, Mathieu Pernot, Mickael Tanter, Mathias Fink, ESPCI ParisTech, CNRS UMR 7587, INSERM, Langevin Institute, Laboratoire Ondes et Acoustique, France

2. **Adaptive Receive and Transmit Apodization for Synthetic Aperture Ultrasonic Imaging**

3. **Fully Automated Multidimensional DCT-Based Penalized Least-Squares Method for Vector Flow Mapping from Conventional Color-Doppler Imaging**

4. **Energy Conversion Improvement in Ferroelectrics: Application to Energy Harvesting and Self-Powered Systems**
Daniel Guyomar, Mickael Lallart, INSA Lyon, LGEF, France

### Session 2I.
**Beamforming**

1. **Temperature Dependence of Shear Modulus in Ex Vivo Muscle Assessed by Ultrasound**
Emilie Sapin, Jean-Luc Gennisson, Mathieu Pernot, Mickael Tanter, Mathias Fink, ESPCI ParisTech, CNRS UMR 7587, INSERM, Langevin Institute, Laboratoire Ondes et Acoustique, France

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Daniel Guyomar, Mickael Lallart, INSA Lyon, LGEF, France

### Session 3I.
**New Developments in Blood Flow Imaging**

1. **Noninvasive Wall Shear Stress Measurements in Human Carotid Artery Using Echo Particle Image Velocimetry: Initial Clinical Studies**
Fuxing Zhang, Alex Barker, Phillip Gage, David Strain, Jonathan Fulford, Luciano Mazzaro, Angela Hall, Nick Bellenger, Craig Lanning, Robin Shandas, University of Colorado at Denver, USA

2. **Characterization of CuInP2S6 Family Two Dimensional Crystals for Ultrasonic Transducers**
Vytautas Samulionis, Juras Banys, Yulian Vysochanskii, Vilnius University, Physics Faculty, Institute of Solid State Physics and Chemistry, Lithuania; Uzhgorod University, Institute of Solid State Physics and Chemistry, Ukraine

### Session 4I.
**Energy Harvesting**

1. **Temperature Dependence of Shear Modulus in Ex Vivo Muscle Assessed by Ultrasound**
Emilie Sapin, Jean-Luc Gennisson, Mathieu Pernot, Mickael Tanter, Mathias Fink, ESPCI ParisTech, CNRS UMR 7587, INSERM, Langevin Institute, Laboratoire Ondes et Acoustique, France

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Daniel Guyomar, Mickael Lallart, INSA Lyon, LGEF, France

### Session 5I.
**Piezoelectric Transducer Materials**

1. **Temperature Dependence of Shear Modulus in Ex Vivo Muscle Assessed by Ultrasound**
Emilie Sapin, Jean-Luc Gennisson, Mathieu Pernot, Mickael Tanter, Mathias Fink, ESPCI ParisTech, CNRS UMR 7587, INSERM, Langevin Institute, Laboratoire Ondes et Acoustique, France

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Daniel Guyomar, Mickael Lallart, INSA Lyon, LGEF, France

### Session 6I.
**Acoustic Propagation**

1. **Temperature Dependence of Shear Modulus in Ex Vivo Muscle Assessed by Ultrasound**
Emilie Sapin, Jean-Luc Gennisson, Mathieu Pernot, Mickael Tanter, Mathias Fink, ESPCI ParisTech, CNRS UMR 7587, INSERM, Langevin Institute, Laboratoire Ondes et Acoustique, France

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### Session 11I.
**Oral --- Wednesday, September 23, 2009**

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Emilie Sapin, Jean-Luc Gennisson, Mathieu Pernot, Mickael Tanter, Mathias Fink, ESPCI ParisTech, CNRS UMR 7587, INSERM, Langevin Institute, Laboratoire Ondes et Acoustique, France

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5. **Electrical Properties of CuInP2S6 Family Two Dimensional Crystals for Ultrasonic Transducers**
Vytautas Samulionis, Juras Banys, Yulian Vysochanskii, Vilnius University, Physics Faculty, Institute of Solid State Physics and Chemistry, Lithuania; Uzhgorod University, Institute of Solid State Physics and Chemistry, Ukraine

6. **The Velocity of Anti-Plane Surface Waves on a Body with Depth-Dependent Properties**
Jan Achenbach, Northwestern University, Mechanical Engineering, USA
12:10 pm  Real-Time Ultrasonic Elastography Imaging for Liver and Kidney: Initial Experience using a Portable Ultrasound System

12:15 pm  A Study of Crossed-Beam Vector Doppler and Speckle Tracking Using Computational Fluid Dynamics

12:30 pm  Toward Non-Invasive Real-Time Volume Blood Flow Assessment in Multi-Element Arrays

12:35 pm  In Vivo Investigation of Real-Time High-Frequency Tomographic Imaging Using Plane-Waves and Pulsed Resonance Beamforming

12:50 pm  Contrast Enhancement of Adaptive Ultrasonic Imaging Using Plane-Wave-Based Minimum Variance Beamforming

12:55 pm  A Novel Technique for Assessing Physical Fluid Properties Using Time Reversal in Speckle Noise

1:00 pm  Measurement of Acoustical Properties of ZnO Single Crystals by the Raman Twisted-Wave Technique

1:05 pm  Towards Non-Invasive, Real-Time Imaging for Liver RF Ablation Assessment: Preliminary in Vivo Results

1:10 pm  Studies of Crossed-Beam Vector Doppler and Speckle Tracking Using Computational Fluid Dynamics

1:15 pm  Measurement of Volume Blood Flow Using 3D Color Doppler Ultrasonic Imaging

1:20 pm  Contrast Enhanced Ultrasonic Imaging Using Plane-Wave-Based Minimum Variance Beamforming

1:25 pm  Fundamentals of Acoustics - Conduction of Sound, Vibration, and Ultrasonic Waves in Crystals with Surfaces and Interfaces

1:30 pm  Acoustic Sensor for Blood and Other Fluids

1:35 pm  Measurement of Acoustical Properties of ZnO Single Crystals by the Raman Twisted-Wave Technique

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6:00 pm  Measurement of Acoustical Properties of ZnO Single Crystals by the Raman Twisted-Wave Technique
# Oral --- Wednesday, September 23, 2009

## Session 1J: Cardiovascular Elastography

**Chair:** Chris de Korte  
*Catholic Univ. of Nijmegen*

### Session 2J: Bioeffects

**Chair:** William O'Brien  
*Univ. of Illinois at Urbana-Champaign*

### Session 3J: Bone II

**Chair:** Pascal Langier  
*Pierre et Marie Curie-Paris 6*

### Session 4J: Ultrasound in Air

**Chair:** Paul Wilcox  
*University of Bristol*

### Session 5J: Micromachined Ultrasonic Transducers

**Chair:** Omer Oralkan  
*Stanford University*

### Session 6J: RF MEMS

**Chair:** Sunil Bhave  
*Cornell University*

### Session 1J: Clinical Value of Two Compounding Techniques for IVUS Palpography

**Mikhail Danilouchkine**, **Frits Mastik**, **Antonius van der Steen**  
*Erasmus Medical Center, Biomedical Engineering, Netherlands*

### Session 2J: Potential Mechanism for Vessel Invagination Caused by Bubble Oscillations

**Wayne Kreider**, **Hong Chen**, **Michael Bailey**, **Andrew Brayman**, **Thomas Matula**  
*University of Washington, Center for Industrial and Medical Ultrasound, Applied Physics Laboratory, WA, USA*

### Session 3J: Tissue Acoustic Impedance of Cortical Bone Is Determined by Nanostructural Characteristics: Hydroxyapatite

**Fabienne Rupin**, **Aurelien Gourrier**, **Mathilde Mouchet**, **Francoise Peyrin**, **Amena Saied**, **Pascal Laugier**  
*Université Pierre et Marie Curie, Laboratoire d'imagerie Paramétrique, France; Université Paris-Sud, Laboratoire de Physique des Solides, Orsay, France; Martin Luther University of Halle-Wittenberg, Q-BAM Group, Dept. of Orthopedics, Halle, Germany; ESRF, Grenoble, France*

### Session 4J: Simultaneous Determination of Physical and Acoustical Properties of a Homogeneous Plate in Air

**Abdelhak El Mouhtadi**, **Jean Doclos**, **Hugues Duflo**  
*Laboratoire Ondes et Milieux Complexes, FRE 3102 CNRS, Groupe Ondes Acoustiques, Laboratoire Ondes et Milieux Complexes Université du Havre IUT Place Robert Schuman, Le Havre, France*

### Session 5J: A Wafer Bonded Capacitive Micromachined Underwater Transducer

*Bilkent University, Electrical and Electronics Engineering Dept., Turkey; Sabanci University, Faculty of Engineering and Natural Sciences, Orhanli-Tuzla, Turkey*

### Session 6J: RF MEMS: Focusing on the Next Step

**Takeo Oita**  
*Nihon Dempa Kogyo Co., Ltd., Tokyo, Japan*

## Sala 1

<table>
<thead>
<tr>
<th>2:30 pm</th>
<th>Sala 1</th>
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<tbody>
<tr>
<td>2.1</td>
<td>Clinical Value of Two Compounding Techniques for IVUS Palpography</td>
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<tr>
<td>2.2</td>
<td>Applications of Low Intensity Pulsed Ultrasound for Functional Bone Tissue Engineering Using Adult Stem Cells</td>
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<tr>
<td>2.3</td>
<td>Impact of a Multi-Frequency Sequence of Measurements on First Arriving Signal Velocity on a Bone Plate Model</td>
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<td>Determination of Plant Water Status Using Air-Coupled Ultrasounds</td>
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## Tarragona

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## Pergamo

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## Baalbek

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</table>
3:00 pm

3.1 3D Elasticity Imaging on an Open- Chest Dog Heart

Gregory W., Xinghua Li, Alan Stone.

3.2 Merodiamible and Ultrasound-Induced Gene Expression Associated with Novel Radiation-Enhancing Therapy


3.3 Imaging Guided Node-Phases Micro-Resolution Using Millimeter-Wave Micro- 

R. S., J. H., T. L., Y. H., X. W.

3.4 Highly Anusume and Ultrasound Sensing with Penetration Robs Configuration

Chen-Cheng Cheng, Cheng-Chieh Lin, Yi-Chun Chen, Yi-Hsiu Chou, Chih-Kung Lee, Chih-Kung Lee, Chih-Kung Lee, Chih-Kung Lee, Chih-Kung Lee

3.5 2D CMUT Water-Bonded Imaging Arrays with a Row-Column Addressing Scheme

Andrew Legall, John Yano, Conner, Radiation Res. and Design Engineering, Radiation, Ontario, Canada

3.6 Super High Frequency Width

Suresh Rajan, Alan Stone.

3:15 pm

3.6 High Quality-Non-Invasive-Full3D Strain Tensor Imaging using a Beam 

H. S. G., K. S., A. S., H. S., H. S., H. S., H. S., H. S.

3.7 Ultrasound-Induced Osteogenesis of Human Mesenchymal Stem Cells 

H. S. G., K. S., A. S., H. S.

3.8 Dispersal of Longitudinal Wave Velocity in Sine-Circular Bone


3.9 Adaptive Fractional Amplitude Splitting Sensor

Fernando J. Alvarado, Rosalinda Alvarado, E. J. A. Instituto de Investigacion, Electronica, Electronica, Electronica, Electronica, Electronica

3.10 Evaluation of CMUT Array for Side-Looking AUV

A. S. M., A. S. M., A. S. M.

3:30 pm

3.10 An Area Hydrophone Based on CMUT Arrays

P. C. P., D. C. P., D. C. P., D. C. P.

3.11 Effects of Mechanical and Electrical Coupling on Parametric Sensing of Mode-Located Sensors

G. M. M., G. M. M., G. M. M.

3:45 pm

3.11 The Growth of Osteoblasts Exposed to High Intensity Focused Ultrasound-Enhanced Osteogenesis of Human Mesenchymal Stem Cells

H. S. G., K. S., A. S., H. S.

3.12 Influence of Geometry on Circumferential Waves Transmitted at the Femoral Neck

A. N., A. N., A. N.

3.13 Investigation of AWI-Annular Arrays


3.14 A Flexible Capillor Microconnected Ultrasonic Transducer with Nonlinear Acousto-Optic Devices for Ultrafast Imaging Applications


3.15 Power Handling and Related Frequency-Related Measurements in Resonant AN and Conventional MEMS

Chong-Zhi, Mei-Wei H., Jia-Chao L., Wei-Deng C.

At 6:30 pm

WEDNESDAY ORAL
### Session 1K: Dynamic Elastography
Chair: James Greenleaf, Mayo Clinic

4:30 pm

1. **Development of an ultrasound imaging system for detectable guidance**
   - **Speaker:** Michael Fink, Duke University, Biomedical Engineering, North Carolina, USA
   - **Institute:** Mayo Clinic, USA

2. **High Resolution Quantitative Imaging of Tissue Elasticity:**
   - **Speaker:** Mickael Tanter, Institut Langevin - Laboratoire d'Acoustique - CNRS, France
   - **Institute:** Hopital Pellegrin, France

3. **Real-Time Calculation of a Limiting Form of the Renyi Entropy for Detection of Sudden Changes in Ultrasound Architecture:**
   - **Speaker:** James Greenleaf, Mayo Clinic, USA
   - **Institute:** Mayo Clinic, USA

4:45 pm

1. **Efficient Finite Element Modelling of Electromagnetic Behaving:**
   - **Speaker:** Michael Hughes, Duke University, Biomedical Engineering, North Carolina, USA
   - **Institute:** Mayo Clinic, USA

2. **Robust Hepatic Shear Modulus Imaging:**
   - **Speaker:** Michael Hughes, Duke University, Biomedical Engineering, North Carolina, USA
   - **Institute:** Mayo Clinic, USA

### Session 2K: Signal Processing
Chair: Svatoslav Nikulov, Belden, USA

4:30 pm

1. **Subtle Changes in Scattering Architecture Form of the Renyi Entropy for Detection of:**
   - **Speaker:** Fuhrhop, Kirk Wallace, Kwesi Agyem, Gregory Wickerhauser, Jon Marsh, Jeffrey Arbeit, Ralph Lanza, Samuel Wickline, Michael Wang, John McCarthy, Victor Lieu, Stephen Smith, S. E. Salcudean, Svetoslav Nikolov, Duke University, Mathematics, USA; 2Washington University, USA; 4Washington University, Internal Medicine, USA
   - **Institute:** Mayo Clinic, USA

2. **Real-Time 3D Intravascular Ultrasound Imaging and Scanhead for Micro-Ultrasound Imaging:**
   - **Speaker:** Aaron Dann, Warren Grundefest, Hua Lee, Rahul Singh, Michael Lee, David Bennett, Michael Wang, National Institute of Biomedical Imaging and Engineering, USA; 2University of British Columbia, Canada; 3British Columbia Cancer Agency, Electrical and Computer Engineering, Vancouver, BC, Canada; 4University of Windsor, Canada; 5University of Windsor, Electrical and Computer Engineering, Lulea, Sweden

### Session 3K: Surgical Automation
Chair: Gregg Trahey, Duke University

4:30 pm

1. **Dynamic Elastography:**
   - **Speaker:** Kathryn Nightingale, France
   - **Institute:** Hopital Pellegrin, France

2. **Force and RANSAC Reconstruction Using Acoustic Radiation:**
   - **Speaker:** Mickael Tanter, Institut Langevin - Laboratoire d'Acoustique - CNRS, France
   - **Institute:** Hopital Pellegrin, France

3. **Robust Hepatic Shear Modulus Imaging:**
   - **Speaker:** Michael Hughes, Duke University, Biomedical Engineering, North Carolina, USA
   - **Institute:** Mayo Clinic, USA

### Session 4K: Material and Defect Characterization
Chair: Roman Maev, University of Windsor

4:30 pm

1. **Elastodynamic Scattering Imaging and Therapeutic Transducers:**
   - **Speaker:** Kathryn Nightingale, France
   - **Institute:** Hopital Pellegrin, France

2. **Real-Time Calculation of a Limiting Form of the Renyi Entropy for Detection of:**
   - **Speaker:** James Greenleaf, Mayo Clinic, USA
   - **Institute:** Mayo Clinic, USA

3. **Efficient Finite Element Modelling of Electromagnetic Behaving:**
   - **Speaker:** Michael Hughes, Duke University, Biomedical Engineering, North Carolina, USA
   - **Institute:** Mayo Clinic, USA

### Session 5K: Medical Imaging and Therapeutic Transducers
Chair: S. Cochran, Duke University

4:30 pm

1. **Hybrid Dual Frequency Transducer and Brachytherapy Dosimetry Based on Lateral:**
   - **Speaker:** Paul Wilcox, Alexander Velichko, Bartjan van der Meer, Jonathan Lee, Stuart Foster, Mike Lee, Emmanuel Cherin, Mike Lee, David Bennett, Edward Light, Xi Du, Glenn Lipscomb, Michael Wang, National Institute of Biomedical Imaging and Engineering, USA; 2University of British Columbia, Canada; 3British Columbia Cancer Agency, Electrical and Computer Engineering, Vancouver, BC, Canada; 4University of Windsor, Canada; 5University of Windsor, Electrical and Computer Engineering, Lulea, Sweden

2. **Cleaning Membranes with Focused Ultrasound:**
   - **Speaker:** Jan Niemi, Johan E. Carlson, Torbjörn Löfqvist, Steve Sharples, Matt Clark, Mike Lee, Emmanuel Cherin, Mike Lee, David Bennett, Edward Light, Victor Lieu, Stephen Smith, S. E. Salcudean, Svetoslav Nikolov, Duke University, Mathematics, USA; 2Washington University, USA; 3Visualsonics Inc., Canada; 4University of Windsor, Canada; 5University of Windsor, Electrical and Computer Engineering, Lulea, Sweden

### Session 6K: Industrial Ultrasonics
Chair: Jiromasu Tsujino, Kanagawa University

4:30 pm

1. **New Ring Array Transducers for Real-Time 3D Intravascular Ultrasound:**
   - **Speaker:** Edward Light, Victor Lieu, Stephen Smith, Mike Lee, National Institute of Biomedical Imaging and Engineering, USA; 2University of British Columbia, Canada; 3British Columbia Cancer Agency, Vancouver, BC, Canada

2. **Closing Membranes with Focused Ultrasound:**
   - **Speaker:** Jan Niemi, Johan E. Carlson, Torbjörn Löfqvist, Steve Sharples, Matt Clark, Mike Lee, Emmanuel Cherin, Mike Lee, David Bennett, Edward Light, Victor Lieu, Stephen Smith, S. E. Salcudean, Svetoslav Nikolov, Duke University, Mathematics, USA; 2Washington University, USA; 3Visualsonics Inc., Canada; 4University of Windsor, Canada; 5University of Windsor, Electrical and Computer Engineering, Lulea, Sweden

### Oral --- Wednesday, September 23, 2009

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<td>3K</td>
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<td>Gregg Trahey, Duke University</td>
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<td>Surgical Automation</td>
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<tr>
<td>4K</td>
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<td>Roman Maev, University of Windsor</td>
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<td>5K</td>
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<td>Svetoslav Nikolov</td>
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<td>Medical Imaging and Therapeutic Transducers</td>
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<tr>
<td>6K</td>
<td>Pergamo</td>
<td>Jiromasu Tsujino, Kanagawa University</td>
<td>4:30 pm</td>
<td>Industrial Ultrasonics</td>
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Periodicity Estimation Under Variations of Scattered Spacings, Thickness and Pulse Frequency: A 2D Simulation Study

Christiano Bittencourt Machado, Mahmoud Meziri, Wagner Coelho de Albuquerque Pereira, Frédéric Padilla, Pascal Laugier

1Université Pierre et Marie Curie, Laboratoire d'Imagerie Paramétrique, Paris, France; 2Université Badji Mokhtar, Laboratoire LM2S, Algeria; 3Federal University of Rio de Janeiro, Biomedical Engineering Program - COPPE, Brazil; 4University of Michigan Medical Center, Department of Radiology, USA; 5Université Pierre et Marie Curie, Laboratoire d'Imagerie Paramétrique, France

Improved Estimation of Parameters of the Homodyned K Distribution

David Hruska, William D. O'Brien, Jr., Michael Oelze

1University of Illinois at Urbana-Champaign, USA

Enhancement of Muscle Visualization in Ultrasonography Using Gabor Filter Bank

Yong-Jin Zhou, Yong-Ping Zheng

1The Hong Kong Polytechnic University, Hong Kong, People's Republic of China

Real-Time Ultrasound Imaging System for Assessing Airway Wall Mechanics In-Vitro

Adam LaPrad, Arnab Majumdar, Bela Suki, Kenneth Lutchen, Thomas Snell

1Boston University, Biomedical Engineering, Boston, MA, USA

Integrated Reflection Coefficient Correction with Respect to Surface Inclination and Axial Distance

Nils Maennicke, Martin Schoene, Kay Raum

1University Halle-Wittenberg, Q-BAM group, Dept. of Orthopaedics, Halle (Saale), Germany

Mechanisms of Image Quality Improvement Utilizing Harmonic Imaging

Gianmarco Pinton, Jeremy Dahl, Gregg Trahey

1Langevin Institute (CNRS UMR 7587), ESPCI ParisTech, INSERM, Paris, France; 2Duke University, Biomedical Engineering, Durham, NC, USA

Filtering and Scan Conversion of 3D Displacement Vectors from a 4D Curvilinear Transducer

Eric Pospisil, Robert Rohling

1University of British Columbia, Electrical and Computer Engineering, Vancouver, British Columbia, Canada; 2University of British Columbia, Electrical and Computer Engineering, Vancouver, British Columbia, Canada

Supersonic Shear Waves Generation in Soft Tissue

Andrey Rybyanets, Maria Lugovaya, Anastasia Rybyanets

1South Federal University, Russian Federation; 2South Federal University, Physical Faculty, Russian Federation

3D Regularized Speed-Map Reconstruction in Ultrasound Transmission Tomography

Radovan Jirík, Igor Peterlik, Jiří Jan, Michael Zapf, Nicole Ruiter

1Brno University of Technology, Dept. of Biomedical Eng., Czech Republic; 2Forschungszentrum Karlsruhe, IPE, Germany

Automatic Real-Time View Detection

Sten Roar Snare, Svein Arne Aase, Ole Christian Mjølstad, Håvard Dalen, Fredrik Orderud, Hans Torp

1NTNU, Circulation and Medical Imaging, Trondheim, Norway; 2GE Vingmed Ultrasound, Oslo, Norway

Signal Analysis for Estimating Mechanical Properties of Viable Cells Using Acoustic GHz-Microscopy

Sebastian Brand, Eric Strohm, Michael Kolios, Kay Raum

1Fraunhofer Institute of Material Mechanics, Halle, Germany; 2Ryerson University, Department of Physics, Toronto, Canada; 3University of Halle, Department of Orthopaedics, Halle, Germany

Adaptive Spatial Compounding for Ocular Imaging

Lawrence Paul

1University of British Columbia, Canada

CREASIMUS: A Fast Simulator of Ultrasound and Image Sequences Using 3D Tissue Motion

Adrien Marion, Didier Vray

1University of Lyon, CREATIS-LRMRN; CNRS UMR5220; INSERM U630; 2University of Lyon, CREATIS-LRMRN; CNRS UMR5220; INSERM U630, France

Session P3-B. Imaging Methods

Chair: Tom Thomas

Boston Scientific
Session P3-C
Beamforming
Chair: Peter Hoskins
University of Edinburgh

10:00 am – 11:30 am
POSTER - Wednesday, September 23, 2009

Session P3-C
Beamforming

P3-C-01
Image Amplitude Estimation with the Minimum Variance Beamformer
Andre Varoquaux, Nikolai Smirnov, Alexei Soroko, Akira Hisada, Ikuhiro Tamura, University of Tsukuba, Tsukuba, Japan

P3-C-02
Transducer Stacks Using a FEM Transducer Model and Spatial Compounding.
Variance Beamformed Images: The Effectiveness of Vanea Varvavouri, C. Vournas, S. Mavrogiannis, C. A. Kontos, S. A. Paliouras, A. A. Tsakiris, Athens University of Economics and Business, Athens, Greece

P3-C-03
Synthetic Aperture Focusing Using a FEM Transducer Model and Spatial Compounding.
Francois Vignon, University of South Carolina, Columbia, SC, USA

P3-C-04
Performance Evaluation on High Frame-Rate Sparse Speckle Tracking
Sasha Vinoage, E. Sathya, D. Fotiadis, 1University of Ioannina, Dept. of Electrical Engineering, Measurements and Instrumentation Lab, Ioannina, Greece; 2Institute of Engineering, Department of Electrical Engineering and Information, University of Ioannina, Greece

P3-C-05
Angular Spectrum Simulation of Pulsed Ultrasound Fields
Tingye Xu, Michael Oppelt, University of Tsukuba, Graduate School of Systems and Information Engineering, Tsukuba, Japan

P3-C-06
A Robust Motion Estimation Using Complex Principal Components
Reza Zahiri Azar, William Walker, 1University of Virginia, Biomedical Engineering, Charlottesville, VA, USA; 2Virginia Commonwealth University, Advanced Biomedical Engineering Research Unit, Richmond, VA, USA; 3IIT Madras, Chennai, Tamil Nadu, India

P3-C-07
Tracing Skull Attenuation for Optimal Probe Placement in Transcranial Ultrasound Applications
Ricardo García, Valentina Scavone, Carolina Garcia, Unitat de Smith, Barcelona, Spain

P3-C-08
Reduced Computational Complexity Estimation: Initial Results
Sébastien Ménigot, Alexandre Yassine, K. A. R. Selim, B. D. A. Ahmed, 1Université François Rabelais de Tours, UMR Université François Rabelais de Tours, Inserm, 47000 Tours, France, Metropolitan Girault; 2University of Tsukuba, Graduate School of Systems and Information Engineering, Tsukuba, Japan

P3-C-09
Performance Evaluation on High Frame-Rate Sparse Speckle Tracking
Sasha Vinoage, E. Sathya, D. Fotiadis, 1University of Ioannina, Dept. of Electrical Engineering, Measurements and Instrumentation Lab, Ioannina, Greece; 2Institute of Engineering, Department of Electrical Engineering and Information, University of Ioannina, Greece

P3-C-10
Propagation of Pulses in Nonlinear Materials
Yigang Du, Frank A. McGuiness, 1University of Virginia, Biomedical Engineering, Charlottesville, VA, USA; 2Virginia Commonwealth University, Advanced Biomedical Engineering Research Unit, Richmond, VA, USA

P3-C-11
Novel 2D Displacement Estimation Using Free-Form Shape Kernel of HPR ROIs in Imaging and Elastography Structures
B.C.P. Lawrie, S.H. Song, C.-H. Huang, M.M. Nilsson, N. Tanaka, 1Korea University, Electrical Engineering and Computer Science, Seoul, South Korea; 2Technical Utrecht University, Electrical Engineering, Dynamics and Systems, Utrecht, The Netherlands; 3Korea University, Department of Biomedical Engineering, Seoul, South Korea; 4Kagoshima University, Department of Biomedical Engineering, Kagoshima, Japan

Session P3-E
Elastography: Clinical Applications
Chair: Jean-Yves Chapelon
INSERM, Lyon
Session P3-G
Vascular Elastography

Chair: Hiroshi Kanai
Tokohu University

P3-G-03 Reflexed Shear Wave Imaging (RSW) of Atherosclerosis

Russell Behler1, Xiaoming Zhang1, Javier Brum1, Carlos Negreira2, Meunier3, Guy Cloutier4; 1University of North Carolina at Chapel Hill, Biomedical Engineering, Chapel Hill, NC, USA; 2Instituto de Física, Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay; 3Departamento de Fisiología, Universidad de la República, Montevideo, Uruguay; 4Department of Mechanical Engineering, Faculty of Engineering, Université Laval, Quebec, Canada.

P3-G-03 Preliminary Results of an Ultrasound Segmentation Method Based on Statistical Unit-Root Test of B-Scan Read Intensity Profiles

Mohd Mustaffa, Mai Kuan Goh2, Robert Billing3; 1Universiti Kebangsaan Malaysia, Medical Faculty, School of Medical Technology, Pathology and Laboratory Medicine, Malaysia; 2University of North Carolina at Chapel Hill, Biomedical Engineering, Chapel Hill, NC, USA; 3United Arab Emirates University, College of Engineering, Abu Dhabi, UAE.

P3-G-03 Polymer Characterization on Langasite Delay Lines using a Transient Elastography Vessel Wall Detection in Echo Particle Image Velocimetry

Y. K. Choe1, S. S. Park2, Y. W. Chi1, C. B. Myung3, S. H. Yi2; 1Yonsei University, Department of Mechanical Engineering, Seoul, Korea, Republic of; 2Yonsei University, School of Medicine, Seoul, Korea, Republic of; 3University of Colorado at Denver, Department of Biomedical Engineering, Denver, Colorado, USA.

P3-G-03 Evaluation of Segmentation Algorithms for Vowel Wall Detection in Echo Particle Image Velocimetry (PIV)

Peng Zhang, Zhi Chen4, Zhi Chen5, Xin Zhang5; 1National University of Singapore, Department of Mechanical Engineering, Singapore, Republic of; 2National Research Institute for Physical Sciences, Japan, Japan; 3National University of Singapore, Department of Mechanical Engineering, Singapore, Republic of; 4Nanyang Technological University, Mechanical Engineering, Singapore, Republic of; 5National University of Singapore, Department of Biomedical Engineering, Singapore, Republic of.

P3-G-03 Monitoring of Several Complex Materials with Ultrasonic Sensors Array

Tanasa Traganos, Staphane Safier2, Pascal Grimaux3, Leiki Naoe1, Tetsuya Ueha1; 1Sandia National Laboratories, Kansas, USA; 2CEA, DAMB, MAM, France; 3CEA, DAMB, MAM, France.

P3-G-03 Novel Airborne Ultrasonic Sensor Using Nanofiber and Laser Doppler Vibrometer

Takayoshiyama1, Y. Hiraizumi1, H. Aoki1, J. Matsuda1, T. Mitogawa1, S. Tsuchiya1; 1Toho University, Department of Mechanical Engineering, Japan, Japan; 2National Institute of Advanced Industrial Science and Technology, Japan, Japan; 3National Institute of Advanced Industrial Science and Technology, Japan, Japan.

P3-G-03 Theoretical and Experimental Studies on Group Velocity for Disturbing the Elasticity of Objects

Yeung, Wing1, Nam Crouse1, Yoon-Chul Oh2; 1University of Toronto, Physics and Astronomy, Canada; 2University of Toronto, Mechanical Engineering, Canada.

P3-G-03 Segmentation of Prostate in Sequences of Ultrasonic B-Mode Images of Caudal Arteries Based on Haar's Extension and Neighboor Distributions

Hyun-Jong Han1, Gun Tae Jeon1, Hyun-Man Cho1, In-Kyong Oh2, Ji Ho Na2; 1Seoul National University, Biomedical Engineering, Seoul, Korea, Republic of; 2Seoul National University, Biomedical Engineering, Seoul, Korea, Republic of.

P3-G-03 Development of Ball SAW Gas Chromatograph for Natural Gas Components

Yukio Yamasaki1, Shigeo Sato1, Hiroki Nagai1, Noritaka Mitakaba1, Shingo Akao2, Hiroki Nagai1, Noritaka Mitakaba1; 1University of Electronic Science and Technology of China, School of Mechatronics Engineering, Sichuan, China; 2Toho University, Mechanical Engineering, Japan, Japan.

P3-G-03 Allow Type of MEMS Ultrasonic Sensor Based on Digital Modulation

Yeong Wang1, Eiko Shiga2; 1University of Electronic Science and Technology of China, School of Electronics Engineering, Sichuan, China; 2Toho University, Mechanical Engineering, Japan, Japan.
Non-Invasive Assessment of Shear Strain in the Carotid Arterial Wall Based on Ultrasound Radiofrequency Data

Tim Idzenga1, Hendrik Hansen1, Richard Lopata1, Chris de Korte1
1UMC St. Radboud, Clinical Physics Laboratory, Dept. of Paediatrics, Nijmegen, Netherlands

Breast Ultrasound Phantom for Image Segmentation Assessment

Isabela Carvalho1, Rodrigo Basto2, Antonio Infantosi2, Marco Antonio von Kruger2, Wagner Pereira3
1COPPE/UFRJ, Biomedical Engineering Program, Biomedical Engineering Program - COPPE/UFRJ, Rio de Janeiro, Brazil; 2COPPE/UFRJ, Biomedical Engineering Program, Rio de Janeiro, Brazil; 3COPPE/UFRJ, Biomedical Engineering Program, Rio de Janeiro, Brazil

A Novel Approach in Liquid-Level Sensing by Trapped-Energy-Mode Thickness Vibrator

Ken Yamada1, Shulei Horiuchi1, Hisato Honda1, Tetsuya Kinai1
1Tohoku Gakuin University, Tagajo, Miyagi, Japan

Performing Microdroplets Mixing Using an Acoustic Transducer with Low Vibration Frequencies

Faten Kardous1, Réda Yahiaoui2, Jean-François Manceau2
1Femto-ST, MN2S, Besancon, France; 2Femto-ST, MN2S, Besancon, France

Ultrasound Wall-Tracking Diameter Distension for Assessment of Arterial Distensibility: An Urgent Need for Direct Stiffness Measurement

Patrick Segers1, Abigail Swillens1, Thomas De Schryver1, Sebastian Vermeersch1, Ernst Rietzschel2, Marc De Buyzere2
1Ghent University, Belgium; 2Ghent University Hospital, Belgium

Classification of Benign and Malignant Breast Tumors by the Contour Analysis and Scatterers Characterization

Yin-Yin Liao1, Po-Hsiang Tsui2, Chien-Cheng Chang2, Chih-Kuang Yeh1
1National Tsing Hua University, Department of Biomedical Engineering and Environmental Sciences, Hsinchu, Taiwan; 2Academia Sinica, Division of Mechanics, Research Center for Applied Sciences, Taipei, Taiwan

Separation and Measurement of Mixed Hazardous Gases by Ball SAW Gas Chromatograph with Sensitive Film Fabricated Using Off-Axis Spin-Coating

Toshihiro Tsuji1, Yuki Kawai2, Kentaro Kobari1, Yutaro Yamamato1, Shingo Akao3, Noritaka Nakaso3
1Tohoku University, JST-CREST, Japan; 2Tohoku University, Japan; 3Toppan Printing Co. Ltd., Tohoku University, JST-CREST, Japan

Acoustic Particle Manipulation in a Microchannel Narrower Than Half a Wavelength: Stability of the Node of Pressure

Iciar Gonzalez1, Luis Fernandez2, Tomas Gomez1, Javier Berganzo2
1CSIC, Spain; 2IKERLAN, Spain

Lateral Motion Estimator for Measurement of Artery-Wall Displacement

Hideyuki Hasegawa1, Hiroshi Kanai2
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(Yxl)21.82° LiNbO3 Pseudo-LFE Acoustic Wave Sensor

Tingfeng Ma1, Chao Zhang2, Zhitian Zhang1, Wenyan Wang1, Guanping Feng2
1Tsinghua University, Department of Precision Instruments and Mechanology, Beijing, People's Republic of China; 2Research Institute of Tsinghua University in Shenzhen, Shenzhen, Guangdong, People's Republic of China

Nonlinear Viscoelastic Measurements in Fluids Using "Acoustical Rheology"

Samuel Callé1, Hélène Moreschi1, Guillaume Renaud2, Marielle Defontaine1
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Passive SAW OFC Pressure Sensor

Michael Roller1, Donald Malocha2
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Session P3-I. Acoustic Sensors

Chair: Kentaro Nakamura
Tokyo Institute of Technology

Session P3-H. Ultrasound Segmentation

Chair: Olivier Basset
CREATIS, Lyon

Session P3-J.

Chair: Olivier Basset
CREATIS, Lyon
### Session P3-J. Defects and Characterization
**Chair:** Bernhard Tittman  
*Pennsylvania State University*

- **P3-J01** Non-Contact Ultrasonic Assessment of the Properties of Vacuum-Packed Dry-Cured Ham  
  *Tomas Gomez1, E Corona2, J Benedito2;*  
  *1CSIC, Spain; 2UPV, Spain*

- **P3-J02** Nonlinear Reaction on Ultrasound Spectroscopy (NRUS) to Monitor the Tightening of Bolts  
  *Jacques Rivière1, Guillaume Renaud1, Sylvain Haupert1, Paul A. Johnson2, Maryline Talmant1, Pascal Laugier1;*  
  *1UPMC Univ Paris 06, Laboratoire d'Imagerie Paramétrique, PARIS, 75006, France; 2Los Alamos National Laboratory, Los Alamos, NM, USA*

- **P3-J03** Inclusion and Pore Classification in Rolled and Unrolled Steel Samples  
  *Ville Kananen1, Joona Eskelinen1, Edward Hæggström1;*  
  *1University of Helsinki, Department of Physics, P.O.Box 64 (Gustaf Hällströmin katu 2a), Helsinki, Helsinki 14, Finland*

### Session P3-L. Lamb Waves
**Chair:** Yook-Kong Yong  
*Rutgers University*

- **P3-L01** Anisotropy Propagation of Lamb Waves in Thin Piezoelectric Plates Under the Influence of Bias Electric Field  
  *Boris Sorokin1, Sergei Burkov1, Olga Zolotova1;*  
  *1Siberian Federal University, Condensed Matter Physics, Krasnoyarsk, Russian Federation*

- **P3-L02** Recognition of Optical Layered BPSK Labels Using Collinear Double-Stage Acoustooptic Processor for Hierarchical Photonic Routing  
  *Nobuo Goto1, Yasumitsu Miyazaki2;*  
  *1The University of Tokushima, Japan; 2Aichi University of Technology, Japan*

### Session P3-M. Optical Interactions
**Chair:** Valeriy Proklov  
*Institute of Radio Engineering & Electricity*

- **P3-M02** Cascaded Acousto-Optical Filtering of Unpolarized Light  
  *Konstantin Yushkov1;*  
  *1M.V. Lomonosov Moscow State University, Physics Dept., Oscillation Physics Chair, Moscow, Russian Federation*

- **P3-M03** Recognition of Optical Layered BPSK Labels Using Gallium Arsenide Double-Stage Acoustooptic Processor for Hierarchical Photonic Routing  
  *Nobuo Goto1, Yasumitsu Miyazaki2;*  
  *1The University of Tokushima, Japan; 2Aichi University of Technology, Japan*
Ohgigaoka, Nonoichi, Ishikawa, 921-8501, Japan
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Andrea Cardoni

Chiara Zuniga

Vladislav Pustovoit

Serguei Beryoza

Hans-Dieter Seelig

Heinz Franke

Vladimir Anisimkin

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Design of Functionally Graded Piezoelectric Ultrasonic Motors Using Topology Optimization
Wilfredo Montealegre Rubio, Emilio C. N. Silva, Glaucio H. Paulino.
University of Sao Paulo, Department of Mechatronics and Mechanical Systems Engineering, SP, Brazil; University of Sao Paulo, Department of Mechatronics and Mechanical Systems Engineering, Brazil; University of Illinois at Urbana-Champaign, Newmark Laboratory, Department of Civil and Environment Engineering, University of Illinois at Urbana-Champaign, IL, USA.

Nonlinear Acoustical Waves in the Air-Filled Resonator
Petr Konicek.
CTU-FEE Prague, Department of Physics, Prague, Czech Republic, Czech Republic.

Highly Oriented Ta2O5 Piezoelectric Thin Films Prepared by RF-Magnetron Sputtering
Shoji Kakio, Takeshi Mitsui, Akinori Tsuchiya, Yasuhiko Nakagawa.
University of Yamanashi, Interdisciplinary Graduate School of Medicine and Engineering, Kofu, Yamanashi, Japan.

Design of New Lateral Field Excitation Langasite Resonant Sensors
Therese Leblois, Colette Tellier.
Institute FEMTO-ST, MN2S, Besançon, France; Institute FEMTO-ST, TF, France.

Design and Evaluation of Low-Profile Micro Ultrasonic Motors Driven by Sector Shaped Piezoelectric Vibrators
Takefumi Kanda, Takashi Ichihara, Koichi Suzumori.
Okayama University, Japan.

Parametric Excitation of Nonlinear Standing Waves in Acoustic Resonators
Michal Bednarik, Milan Cervenka, Petr Konicek.
Czech Technical University in Prague - Faculty of Electrical Engineering, Physics, Prague, Czech Republic, Czech Republic.

In-Situ Monitored Deposition of SiO2 on Longitudinal Wave Based Resonator
Sergei Zhgoon, Alexander Shvetsov, Mihir Patel, Kushal Bhattacharjee.
Moscow Power Engineering Institute, Moscow, Moscow, Russian Federation; RF MD, USA.

Visualization of Flexural Wave Propagation in Helical Coiled Ultrasonic Waveguide
Ryo Tanaka, Masayuki Tanabe, Kan Okubo, Norio Tagawa.
Tokyo Metropolitan University, Department of Information and Communications, Tokyo, Japan.

UltraSonic Thruster (UST)
Alfred Tan, Franz Hover.
Massachusetts Institute of Technology, Mechanical Engineering, Cambridge, MA, USA; Massachusetts Institute of Technology, Mechanical Engineering, MA, USA.

Analysis of Additional Surface Mechanical Features in Micro-Acoustic Devices – a Combined FEM-JTFA Approach
Glenn Matthews, Alireza Baghai-Wadji.
RMIT University, School of Electrical and Computer Engineering, Melbourne, Victoria, Australia.

Theoretical and Experimental Investigations of the Contact Mechanics in Standing Wave Type Phase-Graded Ultrasonic Motors
Ivan Yehnoff, Yehuda Ofir, Igor Buczko.
Technion-Israel Institute of Technology, Institute of Mechanical Engineering, Haifa, Israel; Massachusetts Institute of Technology, Institute of Mechanical Engineering, MA, USA.

Session P3-P.
Acoustic Materials and Structures
Chair: Robert Weigel
Friedrich-Alexander University.

Phase Line/Flat Wide Band/Low Loss Filters Using Dispersion Unidirectional Up-Chirp and Down-Chirp Inter-Digital Transducers
Yusuke Sato, Kunitake Yamamouchi.
Tokyo Institute of Technology, Japan.

Erroneous Assumption of Superluminal Speeds in Green’s Function Theory as the Origin of Singularities in BEM-Based Modelling of SAW and BAW Devices
Alireza Baghai-Wadji.
RMIT University, School of Electrical and Computer Engineering, Melbourne, Victoria, Australia.
**Session P3-S.**

**Medial Imaging Transducers**

**Chair:** Kirk Shung

**USC**

**P3-S-08**

**Non-Linear Measurement of Local Curvature with an Ultrasound Array**

Michael Jung, Elgan Kuchloff, Jing Shi, Hao Gao, Zhen Tu, Klaus-Dieter Klumper, Gerald Gold, Konrad Weierstall. Institut für Biomedizinische Technik, University of Stuttgart, Germany; EIMAG, K. Germany; Robert Bosch and Transducer Technology, Germany.

**P3-S-09**

**The Second-Order Mode Excitation Mechanism of Capacitive Micromachined Lamb Wave Transducers**

Li-Feng Ge, School of Electronic Science and Technology, Anhui University, Hefei, Anhui, China, People's Republic of.

**P3-S-10**

**Non-Scanning Measurement of Local Curvature with an Ultrasound Annular Array**

Michael Lenz, Elfgard Kuehnicke, Joerg Sorber, Hans Georg Trier, Klaus-Peter Richter, Gerald Gerlach. Technical University of Dresden, Germany; 2TIMUG e. V., Germany; 3Richter Sensor and Transducer Technology, Germany.

**Session P3-T.**

**Transducer Modeling**

**Chair:** Jian Yuan

**Boston Scientific**

**P3-T-01**

**Control of Ultrasound Direction with a Miniaturized Double-Transducer for Microwelding Applications**

Michael Mayer, Peter Hess. University of Waterloo, Canada; Hess Innovation GmbH, Switzerland.

**P3-T-02**

**Development of Transducer System for Trace Ultrasonic Imaging of Long Coded Signal**

Nohara Takahashi, Ken Oyaki, Noto T 如井, Tokyo Metropolitan University, Department of Information and Communications Systems Engineering, Tokyo, Japan.

**P3-T-03**

**Wideband multimode Tonpilz Transducer with a Cavity Inside a Head Mass**

Yongrae Roh, Saosometh Chhith. School of Mechanical Engineering, Kyungpook National University, Daegu, Korea, Republic of.

**P3-T-04**

**On Sensitivity and Surface Temperature of Multilayered Linear Ultrasound Phased Arrays for Medical Imaging: Modeling, Prototyping and Experiments**

Mihai State, Andrea Grandi, Lorenzo Spicci, Peter Kerkhof, Peter J. Brands, Frans N. van de Vosse. Eindhoven University of Technology, Netherlands; ESAOTE Spa, Florence, Italy; ESAOTE Europe, Maastricht, Netherlands.

**P3-T-05**

**Toward More Efficient Matching Layers for Piezoelectric Transducers**

Franck Levassort, Pierre Marechal, Olivier Acher. Université François Rabelais, UMR Imagerie & Cerveau, INSERM U930, CNRS ERL 3106, Tours, France; Université Le Havre, LOMC, CNRS FRE 3102, FANO FR 3110, Le Havre, France; CEA DAM, Le Ripault, Monts, France.

**P3-T-06**

**Dynamic Response Estimation of Multilayer Ferroelectret-based Transducers Using Lumped-Element Electromechanical Models**

Jian Yuan, Li-Feng Ge. University of Waterloo, Canada; Hess Innovation GmbH, Switzerland.
Development of High Frequency Annular Array Ultrasound Transducers Using Interdigital Bonded Composites

Hamid R. Chabok1, Jonathan M. Cannata2, Hyung Ham Kim2, K. Kirk Shung2; 1University of Southern California, Dept. of Biomedical Engineering, Los Angeles, CA, USA; 2University of Southern California, Dept. of Biomedical Engineering, Los Angeles, CA, USA

Optimal Design of a Piezoelectric 2D Array Transducer to Minimize the Cross Talk Between Active Elements

Yongseok Rho1, Wooyoung Lee2, Sung-Jin Jang3; 1School of Mechanical Engineering, KAIST, Daejeon, Republic of Korea; 2School of Electrical Engineering, KAIST, Daejeon, Republic of Korea; 3School of Electrical Engineering, Seoul National University, Seoul, Republic of Korea

A Model for Radial Modes in a Piezoelectric Disc Exhibiting Non-Uniform Polarization: Application to a Bi-Frequency Transducer, Method Design, Simulation and Experiments.

Héctor Calás1, Leslie Pérez-Fernández2, Eduardo Moreno2, Antonio Ramos1, Jose A Eiras3; 1Instituto de Acústica, Spain; 2ICIMAF, Cuba; 3UFScar, Brazil

Multiple Frequencies Ultrasonic Imaging Using Multiple-Resonance Transducer

Sovik Adhikary1, Namol Yoshida2, Kenzou Nakamura2; 1Bosechiro Institute of Technology, Department of Electrical and Electronic Engineering, Tokyo, Japan; 2Tokai University, Faculty of Science and Engineering, Kakamigahara, Japan

A Wideband Annular Piezoelectric Composite Transducer Configuration with a Graded Active Layer Profile

Sivaram Nishal Ramadas1, Richard L O’Leary1, Anthony Gachagan1, Gordon Hayward1, Robert Banks2; 1Centre for Ultrasonic Engineering, University of Strathclyde, United Kingdom; 2Weidlinger Associates Inc, USA

Multiple Resonance Ultrasonic Preamplifiers for Ultrasound Imaging

Pascal Chatain1, David Voisin1, Mathieu Legros1, Guillaume Ferin1, Rémi Dufait1; 1Vermon, France

Operation of a High Frequency Piezoelectric Ultrasound Array with an Application-Specific Integrated Circuit

Anne Bernassau1, Tim Button2, Kyusun Choi3, Sandy Cochran1, Christine Demore1, Luis Garcia-Gancedo2, David Hutson1, Tom Jackson4, Hyunsoo Kim4, Insoo Kim5, Carl Meggs2, Susan Trolier-McKinstry6, Rick Tutwiler7; 1Institute for Medical Science and Technology, University of Dundee, Dundee, United Kingdom; 2Functional Materials Group, University of Birmingham, Birmingham, United Kingdom; 3Department of Computer Science and Engineering, The Pennsylvania State University, State College, PA, USA; 4Center for Thin Film Devices and Materials Research Institute, The Pennsylvania State University, State College, PA, USA; 5Department of Electrical Engineering, The Pennsylvania State University, State College, PA, USA; 6Materials Research Laboratory, The Pennsylvania State University, State College, PA, USA; 7Applied Research Laboratory, The Pennsylvania State University, State College, PA, USA

High Frequency Single-Crystal Ultrasound Probe

Claire Bantignies1, Pascal Mauchamp1, Guillaume Ferin1, Stéphane Michau1, Rémi Dufait1; 1Vermon, France

High Frequency Piezo-Composite Transducer With Hexagonal Pillars

Jianhua Yin1, Mike Lee1, Emmanuel Cherin1, Marc Lukacs1, Stuart Foster1; 1Imaging Research, Sunnybrook Health Science Centre, Toronto, ON, Canada
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## Condensed Program of 2009 IEEE International Ultrasonics Symposium

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### Invited Talks: (1) 1st Time Slot  (3) 3rd Time Slot  (5) 5th Time Slot

### Color Codes:
- **Group I: Pink** - Medical Ultrasound
- **Group II: Purple** - Sensor, NDE, Industrial Applications
- **Group III: Green** - Physical Acoustics
- **Group IV: Orange** - Microacoustics – SAW, FBAR, MEMS
- **Group V: Blue** - Transducers & Transducer Materials

### SATURDAY, Sep. 19

- **Condensed Program --- 2009 IEEE International Ultrasonics Symposium, Rome, Italy, September 20-23, 2009**
  - Symposium Registration (Volubilis), 6:00 p.m. – 9:00 p.m.

### SUNDAY, Sep. 20

- **Short Courses (Refreshments in Galleria Expo at breaks)**
  - Symposium Registration (Volubilis), 7:00 a.m. – 6:00 p.m.

### Short Courses:
- **9:00 a.m. – 12:00 p.m.**
  - **1A:** Film Bulk Acoustic Resonator (FBAR) (Hama)
  - **2A:** Materials for Acoustic Wave Devices (Elsew)
  - **3A:** Microwave Acoustic Sensors (Merida)
  - **4A:** Therapeutic Ultrasound (Polia)
  - **5A:** Ultrasonic NDE and Industrial Process Diagnostics at High Temperatures (Cesarea)
  - **6A:** Estimation and Imaging of Blood Flow Velocity (Spalato)

- **1:00 p.m. – 5:00 p.m.**
  - **1B:** SAW Modeling Techniques (Hama)
  - **2B:** Piezoelectric Ultrasound Transducer Fundamentals - Materials, Structure, Behavior, and Analysis (Spalato)
  - **3B:** Quantitative Acoustic Microscopy - Fundamentals and New Applications from Cells to Airplanes (Merida)
  - **4B:** Ultrasound Imaging Systems: from Principles to Implementation (Polia)
  - **5B:** Passive UHF RFID Tags, Systems & Applications (Elsew)
  - **6B:** Ultrasonic Signal Processing for Detection, Estimation & Imaging (Cesarea)

- **6:00 p.m. – 9:00 p.m.**
  - **1C:** Time Reversal Acoustics (Merida)
  - **2C:** Ultrasound Contrast Agents: Theory and Experiment (Spalato)
  - **3C:** Zooming into the Near Field (Elsew)
  - **4C:** CMUTs: Theory, Technology, and Applications (Polia)
  - **5C:** Guided SAW Devices for Liquid-Phase Biochemical Sensors (Hama)
  - **6C:** Elasticity Imaging: Dynamic Approaches (Cesarea)
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<td>Symposium Registration (Volubilis), 7:00 a.m. – 6:00 p.m.</td>
<td>Plenary Session (Leptis Magna – For All Attendees)</td>
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<td>1:00 p.m. - 2:30 p.m.</td>
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<td>2:30 p.m. - 4:00 p.m.</td>
<td>1B. Contrast Agents and Sonoporation (IV)</td>
<td>2B. Therapy Monitoring, Control, and Quality Assurance</td>
<td>3B. Transducers &amp; Ultrasound Modeling</td>
<td>4B. Advances in NDE (III)</td>
<td>5B. BAW Modeling</td>
<td>6B. Visualization Interferometry (III)</td>
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<td>1C. New Methods &amp; High Prop. Ultrasound for Tissue Characr. (II)</td>
<td>2C. Therapeutic In-Vivo Studies</td>
<td>3C. CMUT Modeling (III)</td>
<td>4C. Acoustic Wave Sensors</td>
<td>5C. BAW 1 (III)</td>
<td>6C. Novel Ultrasonic Motors I</td>
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<td>Gala Dinner Awards Reception (Le Quattro Stagioni Restaurant &amp; Space by the Pool)</td>
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<td>1D. Clinical Ultrasound (1I)(5I)</td>
<td>2D. High Freq Ultrasound &amp; Its Applications</td>
<td>3D. Elastography</td>
<td>4D. Low Sensing</td>
<td>5D. Oscillations &amp; Temp. Compensation (1I)</td>
<td>6D. Bulk Wave Effects and Devices</td>
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<td>1E. Therapeutic Arrays Electrodes</td>
<td>2E. Microbubbles Characterization &amp; Modeling</td>
<td>3E. Elastography Methods Electrodes</td>
<td>4E. Array Imaging (3I)</td>
<td>5E. SAW II</td>
<td>6E. Ultrasound Linear Motors (1I)</td>
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<td>2:30 p.m. – 4:00 p.m.</td>
<td>1F. Therapeutic Applications Ultrasound Linear Motors (1I)</td>
<td>2F. Contrast Agent Imaging Ultrasound Linear Motors (1I)</td>
<td>3F. Cardiac Imaging Ultrasound Linear Motors (1I)</td>
<td>4F. NDE Signal Processing Ultrasound Linear Motors (1I)</td>
<td>5F. SAW Device Design (1I)</td>
<td>6F. Phonic Crystals Propagation</td>
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<td>4:30 p.m. – 6:00 p.m.</td>
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<td>2G. Tissue Characterization Ultrasound Linear Motors (1I)</td>
<td>3G. Cancer Imaging Ultrasound Linear Motors (1I)</td>
<td>4G. Nanoscale Acoustic Sensing (1I)</td>
<td>5G. Novel SAW Materials &amp; Structures Ultrasound Linear Motors (1I)</td>
<td>6G. High Frequency Transducers &amp; Arrays</td>
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<td>4H. Acoustic Imaging and Characterization</td>
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<td>5H. Novel Devices &amp; Systems (1I)</td>
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<td>6H. Phononic Crystals - Devices, Filters, Couplers</td>
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<td>10:00 a.m. – 11:30 a.m.</td>
<td>Posters and Refreshments (Sala Orange)</td>
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<td>P3-A. Tissue Charact.</td>
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<td>P3-B. Imaging Methods</td>
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<td>P3-C. Beamforming</td>
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<td>P3-D. Signal Processing</td>
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<td>11:30 a.m. – 12:00 p.m.</td>
<td>1. Elasticity and Thermal Effects</td>
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<td>2. Beamforming</td>
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<td>12:00 p.m. – 1:00 p.m.</td>
<td>Lunch</td>
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<td>2:30 p.m. – 3:00 p.m.</td>
<td>4J. Cardiovascular Biolography (5I)</td>
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<td>4J-B. Defects</td>
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<td>3:00 p.m. – 4:00 p.m.</td>
<td>4J-Bone II</td>
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<td>4J-Ultrasound in Air</td>
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<td>5J-Micromachined Ultrasonic Transducers</td>
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<td>4:00 p.m. – 4:30 p.m.</td>
<td>Refreshments (Leptis Magna Foyer, Baalbek Foyer and Tarragona Foyer)</td>
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<td>4:30 p.m. – 5:00 p.m.</td>
<td>5K. Dynamic Elastography</td>
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<td>5K. Medical Imaging and Therapeutic Transducers</td>
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<td>6K. Industrial Ultrasonics</td>
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