



Short Course on October 7, 2012

Title: **Nonlinear Acoustics and Harmonic Imaging**

Instructors: **Victor Humphrey**, Institute of Sound and Vibration Research

Course Description

This course will provide an introduction to the origins of non-linear propagation, and its consequences and applications in medical ultrasound.

The first section will review the basic physics of nonlinear propagation and discuss the propagation of plane waves as a means of introducing non-linear acoustics terminology. This will be followed by a discussion of the techniques used to numerically model non-linear propagation and the specific problems of performing measurements in high amplitude fields with their associated distortion and harmonic content.

The effects of diffraction and attenuation on non-linear propagation will then be introduced by considering the fields of transducers and arrays, and the fields they generate in tissue; this will be illustrated by a combination of experimental results and model predictions. This will lead on to a discussion of the consequences for medical ultrasound of non-linear propagation. Finally the application to harmonic imaging will be described.

Victor Humphrey is a Professor of Acoustics at the Institute of Sound and Vibration Research (ISVR) in Southampton, U.K. He received his B.Sc. and Ph.D. degrees from the University of Bristol in 1975 and 1981, respectively. He then moved to the School of Physics at the University of Bath where was promoted to Senior Lecturer. In 2004 he took up his current position at ISVR. His initial research was in the area of laboratory applications of non-linear parametric arrays in underwater acoustics. For this work he was awarded the Institute of Acoustics A.B. Wood Medal 1988. Subsequently he helped to develop a research programme on the non-linear propagation of ultrasound in medical fields that investigated these fields both numerically and experimentally. He was awarded the University of Bath Mary Tasker Award for excellence in teaching in 1995.

Conference website: http://ewh.ieee.org/conf/ius_2012

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