TEMPERATURE MEASUREMENT USING INFRARED THERMOGRAPHY OF THE DIELECTRIC IN A DBD PLASMA ACTUATOR DEDICATED TO SUBSONIC AIRFLOW CONTROL

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In order to use the non-thermal plasmas for subsonic airflow control, plasmas created on a dielectric surface have been widely investigated by researchers and engineers in several coutries[1]. The plasmas in these studies were mainly generated by a corona discharge or a dielectric barrier discharge (DBD). Usually, electrical parameters including active power are measured as well as the induced ionic wind velocity[2]. Sometime, spectroscopic measurement using nitrogen molecular emission band was performed to determine the temperature of the weekly ionized hot gas (i.e. non thermal plasma in this case) over the dielectric surface.

To avoid the apparition of an electric arc which can damage definitively the dielectric and/or the electronic instruments in the vicinity of the actuator, dielectric barrier discharge was used in the majority of these studies, because the discharge current is self-limited and any arcing is not possible unless when the dielectric is broken.

As the dielectric is heated during the actuator operation, the measurement of the dielectric temperature is useful to better characterize the actuator. We have performed measurement of the dielectric temperature using an infrared camera. Since our DBD actuator is supplied with a sine high voltage, the time evolution of the temperature is measured as function of its peak value and frequency.

1. E. Moreau, "Airflow control by non-thermal plasma actuators", Journal of Physics D: Applied Physics, **40** (2007), 605-636.
2. B. Dong, JM. Bauchire, JM. Pouvesle, P. Magnier and D. Hong, "Experimental study of a DBD surface discharge for the active flow control of subsonic airflow", Journal of Physics D: Applied Physics, **41** (2008), 155201, 9 pages