Application of Electrohydrodynamics for Flow Control in Energy Systems

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Brief Biographical Sketch

P. K. Panigrahi is a faculty in ME, IIT Kanpur since January 1998 after receiving his Ph.D. (Mechanical Engineering) and M.S. (Mechanical Engineering and Computer Science) from LSU, USA. He has implemented several experimental techniques (primarily optical) in both large- and small-scale systems like Interferometry, LDV, Schlieren, Holography, LCT, PIV, LIF, IRT, Thermophoretic Sampling, Scattering etc. These techniques have been used for investigation and design of several energy systems like gas turbine blade cooling, fluid structure interaction, combustion, battery cooling, crystal growth, gas hydrate, electro-atomization, jet mixing, synthetic jets, DBD plasma actuators, thermal hydraulics of nuclear power plants, drug delivery systems, underwater vehicles etc.

Abstract

Electrohydrodynamics, which explores the interaction between electric forces and fluid flow offers several applications in flow control of energy systems. This seminar will present some of the developmental activities carried out at IIT Kanpur on DBD plasma actuator, ionic wind generator and electrospray. The application of these systems for wind turbine, fuel-air mixing, micro-capsule fabrication for targeted drug delivery, electronics & battery thermal management and implementation of machine learning based control will be demonstrated. The advantages of these systems are simple design, light weight, no-moving part, cheap, fast response and low power consumption etc. The seminar will be informative in nature using flow visualizations, without going into detailed presentation of results, for discussion on future collaboration.