

2009 Departmental Seminar

Thursday 8 October 2009

3.00 pm

Mechanical Engineering Seminar Room – E547

An Overview of Mechanical Engineering at the University of Kansas and a Discussion of Correlation Transfer

Professor Ronald L. Dougherty, Erskine Visitor from University of Kansas

Abstract:

This talk will be composed of two separate components: (1) a brief overview of the University of Kansas (KU) and Mechanical Engineering at KU (KUME), and (2) an introduction to Correlation Transfer research.

KU and KUME:

Located in the center of the continental US, the state of Kansas has three major research universities, with the University of Kansas being the state's "flagship" university. KU was established in 1866 in the city of Lawrence, Kansas; and, of the first four graduates in 1873, one was an engineer. The Mechanical Engineering Department was initiated in 1899. Today, KU has approximately 30,000 students and about 2400 faculty, while KUME has approximately 400 students and 18 faculty.

Further information will be provided on KU's and KUME's activities, particularly with regard to international studies and research.

Research Activities:

Dr. Dougherty's background is in thermal radiative transfer - specifically, modelling radiative transfer of high energy electromagnetic beams (e.g., lasers) which propagate through participating media (scattering and absorbing) and experimentally validating/improving those models.

For about 60 years, lasers have been employed in many applied and research situations. With regard to this talk, lasers have been used for remote sensing, imaging, and characterization of fluid-particle suspensions. In order to determine the results of laser probing of a given material, it is necessary to understand/model scattering and absorption of light within those various materials/media. This talk is targeted toward the use of lasers in the determination of the sizes, shapes and concentrations of particles suspended in fluids.

Since Dynamic Light Scattering (DLS) or [Photon Correlation Spectroscopy (PCS)] was first developed in the 1970s, it has been employed to characterize fluid-particle suspensions. Assuming that the particle's diameter is between a few nanometers and a few microns, and that its density is approximately that of the fluid within which it is suspended, Brownian motion dominates; and, by using singly scattered laser light, the diameter of the particles (or diameters for a distribution of particle sizes) can be determined quite accurately. However, when multiple scattering occurs, DLS cannot be used reliably to determine particle size. In this talk, Correlation Transfer, a novel combination of DLS and Radiative Transfer, will be discussed as a method for use in multiple scattering situations to accurately determine particle size in a fluid-particle suspension.

All are welcome!