AEROSPACE & MECHANICAL ENGINEERING

2012 COLLOQUIUM 2013
SEMINARS ARE OPEN TO THE PUBLIC

UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: **Dr. Filippo Coletti**
Department of Mechanical Engineering
Stanford University
Stanford, California

TOPIC: **MEDICAL IMAGING AS A TOOL FOR INVESTIGATING ENGINEERING FLOWS**

DATE: Tuesday, February 5, 2013

TIME: 3:30 p.m.

PLACE: Lower Level Auditorium, Geddes Hall

RECEPTION: 3:00 – 3:30 p.m. – Coffee House, Geddes Hall

ABSTRACT

Magnetic Resonance Imaging (MRI) and X-ray computer tomography (CT) are well-established techniques in the medical community, able to produce volumetric images of the human body. MRI can also be used to perform accurate velocimetry in fluid flows, thanks to the phase-sensitivity of the MR signal to particle motion. CT recently demonstrated its potential to measure concentration distributions in multiphase flows.

In this seminar recent applications will be presented in which mean velocity and scalar fields are measured with high spatial resolution by MRI. Those include: three-dimensional diffusers, jets in cross-flow, turbine airfoil cooling configurations, compact heat exchangers, and flow in porous media. The potential of X-ray CT to probe spray atomization is also demonstrated. In all considered configurations, the focus is on the turbulence transport and mixing properties. The advantages of medical imaging techniques emerge: the capability of providing three-dimensional fields; the ease of dealing with complex geometries; the high data yield; and the freedom from optical accessibility. The great potential for developments in environmental and biomedical engineering is discussed.

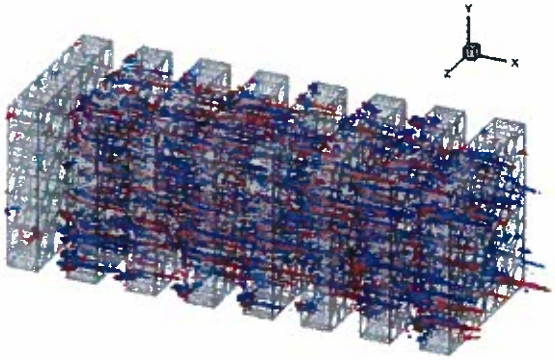

Illustration: Flow through perforated fins with random hole distribution. Isosurfaces of positive (negative) streamwise vorticity are highlighted in red (blue). Reynolds number based on mean hole diameter and inner velocity is 380. The flow is in positive X direction.

NOTE: ***If you are interested in meeting individually with Dr. Coletti, please contact Linda at 631-5431***