THE UNIVERSITY OF MELBOURNE

Mechanical Engineering 2008 Tewkesbury Lecture

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Professor Ellen Longmire

Department of Aerospace Engineering and Mechanics, University of Minnesota, Minneapolis, USA

Tuesday, 7th October, 3.30pm

G73 Theatre, Ground Floor, 200 Berkeley St, Building 260, Parkville

4.30pm, Refreshments

Conference Room, Level 4, Bldg 170

Mechanical Engineering

Experiments on drop collision and coalescence.

MORE INFORMATION

For more Mechanical Engineering seminar information contact:

Professor Ivan Marusic
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Abstract:

Coalescence transitions in mixtures of oil- and water-based fluids are investigated with the goal of understanding the underlying dynamics and of eventually developing accurate numerical models for practical applications such as transport, mixing, and separation of petroleum, chemical, and waste streams. Two geometries have been examined: drops impacting and eventually coalescing at a quiescent interface and coalescing drop pairs. Refractive index matching and laser induced fluorescence are employed to obtain clear images of the interfaces and interior volumes within each flow. Real-time flow sequences of planar fields are acquired using a high-frequency laser and camera system, and the resulting images are analyzed to determine interfacial behavior as well as two- and three-component velocity fields. In the drop/interface case, coalescence occurs after buoyancy-driven film thinning.

In the drop/drop case, coalescence is associated with significant deformation and vortex-driven induction. The effects of viscosity ratio, impact Weber number and impact angle will be discussed.

Biography:

Professor Longmire uses experimentation and analysis to answer fundamental questions in fluid dynamics that affect industrial, biomedical, and environmental applications. Recently, her work has focused on single- and multi-phase turbulent flows, liquid/liquid mixtures with surface tension, microscale flows, and biomedical flows. Professor Longmire is also well known for her leading studies in particle-laden turbulence and multiphase flow. She is a Fellow of the American Physical Society. a recpient of the National Science Foundation National Young Investigator Award and a University of Minnesota McKnight Land-Grant Professorship. She currently serves as an Associate Editor for Experiments in Fluids and Physics of Fluids and as the Secretary/Treasurer of the American Physical Society Division of Fluid Dynamics.