

DISTINGUISHED SPEAKER SERIES

Exploration and Control of Transverse Jet Shear Layer Instabilities

Complex flow phenomena are widely present in systems involving energy generation and propulsion, and control of such fundamental phenomena is key to development of efficient, robust engineering systems. This talk will describe research at UCLA on flow instabilities and their control, in the spirit of this fundamental approach, with a focus on the canonical gaseous jet in crossflow (JICF) or transverse jet. New insights into JICF shear layer stability characteristics have created the potential for tailored flow control which can improve molecular mixing and other important features of the jet flow. Quantification and interrogation of the flowfield involves use of acetone planar laser-induced fluorescence (PLIF) imaging and simultaneous stereo particle image velocimetry (PIV) as well as hot wire anemometry. Transitions in shear layer instabilities from convective to absolute instability are observed to depend on specific flow conditions, with attendant alterations in jet structure and symmetry that can have a significant effect on mixing metrics. These fundamental stability characteristics require alternative methods for jet control, depending on the flow regime, which can optimize performance of the jet in various applications.

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