MECHANICAL ENGINEERING MSc SEMINAR (30 min.)

Thursday, February 12, 2026 at 13:30-14:00, Lady Davis Building, Auditorium 250

Flow properties and fiber transport across high-shear interfaces in coaxial, round jets

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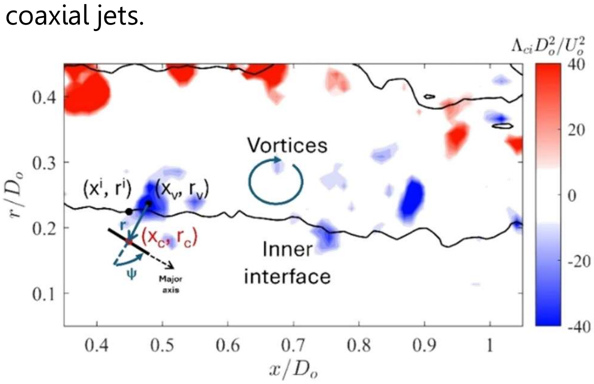
Jet flows arise in a wide range of engineering and environmental applications, including particle transport, combustion, and mixing. In this experimental research, the near-field flow and fiber dynamics of turbulent, round coaxial jets were examined. Coaxial jets are characterized by multiple shear layers that generate coherent vortical structures that govern momentum transfer, turbulent mixing, and interfacial behavior. The flow field is strongly influenced by the velocity ratio between the outer and inner jets, nozzle geometry, among others. The first part of the research was focused on the dynamics of the instantaneous inner and outer shear-layer interfaces, that were identified using (modal)-velocity based detection methods. Conditional averaging of flow properties such as velocities and Reynolds stresses across the interfaces, revealed sharp gradients in these properties at the interfaces underscoring their dominant role in momentum and turbulent kinetic energy exchange. The second part was focused on fiber-laden coaxial jet flows, in which millimeter-sized rigid, inertial fibers were introduced into the inner jet and their interaction with near-field vortical structures was investigated at a velocity ratio of 2.5. The transition location of individual fibers was determined based on the distribution of the instantaneous in-plane fiber rotation rate. Conditional averaging performed around this location revealed sharp fiber velocity gradients across the transition position coinciding with peak fiber rotation rates. Fiber motion was analyzed in the frame of reference of the "nearest" vortex and results indicated that near transition fibers "locked-on" to strong coherent vortices that dictated their motion in a sling-effect-like manner. The present results provide new physical insight into the mechanisms governing fiber transport in turbulent coaxial jets.



Note: the seminar will be given in English

Seminars Coordinator: Prof. Sefi Givli