Date: Friday, February 24, 2017
Time: 11:00 AM
Location: Gilman Hall # 132
Speaker: Prof. Beverley McKeon (California Institute of Technology)
Title: “Systems analysis of wall turbulence: Characterizing natural and synthetic self-sustaining processes”

Abstract

The financial and environmental cost of turbulence is staggering: manage to quell turbulence in the thin boundary layers on the surface of a commercial airliner and you could almost halve the total aerodynamic drag, dramatically cutting fuel burn, emissions and cost of operation. Yet systems-level tools to model scale interactions or control turbulence remain relatively under-developed. The resolvent analysis for turbulent flow proposed by McKeon & Sharma (J. Fluid Mech, 2010) provides a simple, but rigorous, approach by which to deconstruct the full turbulence field into a linear combination of (interacting) modes. After a brief review of some key results that can be obtained by analysis of the linear resolvent operator concerning the statistical and structural make-up of wall turbulence, I will describe some of our recent progress towards determining how to reconstruct self-sustaining turbulent systems, both natural and synthetic. Implications for both the classical picture of wall turbulence and control of turbulent flows will be discussed.