# Turbulent Flow Interactions with Complex Topography: From Multi-Scale Roughness to Barchan Dunes

**Tuesday, October 29, 2013, 3:30P.M.**

**Lower Level Auditorium,**

**Geddes Hall**

Refreshments served at 3:00 p.m. in the Geddes Hall Coffee House

This talk will highlight on-going studies of interactions between turbulence and complex topography. One such scenario is multi-scale surface roughness commonly encountered on flow surfaces, such as turbine blades and hulls of ships, as well as in nature (gravel river beds, for example). In the case of industrial applications, such realistic roughness is typically due to cumulative damage to a flow surface that was likely aerodynamically or hydrodynamically smooth prior to deployment but has become significantly roughened via cumulative damage and/or deposition. The present effort is devoted toward identifying the impact of multi-scale roughness replicated from a turbine blade damaged by deposition of foreign materials (but reminiscent of a broad range of multi-scale topographies in industry and nature) on wall turbulence. Several particle-image velocimetry (PIV) experiments were conducted for flow over this surface, both within and outside the roughness sublayer, to explore its impact on the canonical statistical and structural nature of smooth-wall turbulence. The latter portion of this talk will highlight on-going experiments of flow over barchan dunes. Fixed-bed barchan models are utilized in a new refractive-index-matched flow facility to study interactions between dunes arranged in various alignments using PIV. The optically-unimpeded access afforded by the RIM methodology provides unique views of the rich flow dynamics associated with these turbulence–complex topography interactions.

**Dr. Kenneth T. Christensen**
Mechanical Science and Engineering Department
University of Illinois
Urbana-Champaign, Illinois

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