

Weekly CEA FM Seminar: Fall 2017



JOHNS HOPKINS
Center for Environmental
& Applied Fluid Mechanics

Date: **Friday, October 6, 2017**

Time: 11:00 AM

Location: Hodson Hall # 210

Speaker: **Prof. Phillip M. Ligrani** (University of Alabama in Huntsville)

Title: ***“Heat Transfer Enhancements from Elastic Turbulence using Sucrose-Based Polymer Solutions”***

Abstract

The influences of elastic turbulence on convective heat transfer, within a C-shaped passage of a viscous disk pump, are experimentally determined using viscoelastic fluids, and Boger fluids, which are constant viscosity solvents. Different concentrations of polyacrylamide in 65 percent sucrose solutions are used, along with solutions with 65 percent sucrose only, as different magnitudes of shear stress and strain rate are imposed upon the flow field. Transition and development of elastic turbulence are characterized, along with convective heat transfer enhancements. The resulting increased levels of mixing, transport, and diffusion from elastic turbulence give convective heat transfer coefficient enhancements which are as large as 240 percent, relative to Boger fluids at the same shear rate, rotation speed, flow passage height, and flow temperature. Variations of spectra of static temperature fluctuations, and mean-square magnitudes of fluctuating static temperature provide evidence of increased flow irregularities and unsteadiness (relative to Boger solution flows), which result from elastic turbulence induced polymer twisting, convolutions, and interactions.