

Weekly CEA FM Seminar: Spring 2015



JOHNS HOPKINS

Center for Environmental
& Applied Fluid Mechanics

Date: **Friday, April 10, 2015**

Time: 11:00 AM

Location: Gilman Hall # 132

Speaker: **Prof. Johan Larsson** (University of Maryland, College Park)

Title: ***"The Effect of Strong Wall-Cooling on High-Speed Turbulent Boundary Layers"***

Abstract

The main difference between high-speed and low-speed boundary layers is that the temperature profile is significantly non-uniform in the former, leading to non-uniform density and viscosity profiles and, as a consequence, an altered scaling of the mean velocity gradient. For boundary layers over adiabatic walls, this altered scaling can be accounted for by the van Driest (1951) transformation, which restores an element of universality to the mean velocity profile. For non-adiabatic walls, however, this transformation fails. A novel transformation approach is proposed based on arguments about scaling and universality. The transformation is tested on a sequence of compressible channel flows, where the wall cooling-rate is a function of the Mach number.

Bio

Johan Larsson is an Assistant Professor at the University of Maryland (College Park) where he works on multiple problems in the field of computational turbulence, including shock/turbulence interaction, wall-modeling for large eddy simulation at very high Reynolds numbers, and turbulent combustion. He earned his PhD at the University of Waterloo, Canada, prior to joining the Center for Turbulence Research at Stanford University where he worked for 6 years before joining the University of Maryland in 2012.