

Abstract Submitted  
for the DFD14 Meeting of  
The American Physical Society

**Differing effects of viscosity and density changes on turbulence in high Karlovitz premixed flames** BROCK BOBBITT, GUILLAUME BLANQUART, California Institute of Technology — The change in turbulence characteristics through a premixed flame is an important phenomenon in premixed turbulent combustion as the characteristics behind the preheat zone are the relevant quantities for the effects on the reaction zone. Both the fluid properties of viscosity and density are altered through the preheat zone which induce changes to the turbulence. As the viscosity can increase by a factor of 30 and density can decrease by a factor of 6 in many hydrocarbon/air flames, these effects are significant. This work focuses on the individual effects of each of these fluid properties to better understand the coupling of the turbulence and flame. This is analyzed through high Karlovitz number Direct Numerical Simulations of a *n*-heptane/air flame and varying the relative importance of density and viscosity. The viscosity change relates to viscous dissipation while the density change relates to dilation and baroclinic torque in the vorticity equation.

Brock Bobbitt  
California Institute of Technology

Date submitted: 01 Aug 2014

Electronic form version 1.4