Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

DNS of soot formation in three-dimensional turbulent non-premixed jet flames ANTONIO ATTILI, FABRIZIO BISETTI, King Abdullah University of Science and Technology, MICHAEL E. MUELLER, Department of Mechanical and Aerospace Engineering, Princeton University, HEINZ PITSCH, RWTH Aachen University — A set of three-dimensional Direct Numerical Simulations (DNS) of soot formation in a three-dimensional n-heptane/air turbulent non-premixed jet flame has been performed to investigate the coupling between turbulence, chemistry, and soot dynamics with varying Damköhler number. Finite rate chemistry of Polycyclic Aromatic Hydrocarbons (PAH) is included in the chemistry model. Soot is described with a bivariate distribution in volume-surface sample space, and a selected number of moments of the distribution are transported via a recently proposed transport Lagrangian scheme. Closure of the soot moment equations is achieved via the Hybrid Method of Moments (HMOM). It is observed that, for smaller Damköhler number, the mass fraction of soot particles decreases while the number density stays approximately constant. In addition, Lagrangian statistics are used to study the evolution and transport of soot aggregates during their movement in physical and mixture fraction space.

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Date submitted: 30 Aug 2012 Electronic form version 1.4