Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Monte Carlo Simulation Of Soot Evolution along Lagrangian Trajectories in a Turbulent Flame AHMED ABDELGADIR, KUN ZHOU, ANTONIO ATTILI, FABRIZIO BISETTI, Clean Combustion Research Center, KAUST — A newly developed Monte Carlo method is used to simulate soot formation and growth in a turbulent n-heptane/air flame. The Monte Carlo method is used to simulate the soot evolution along selected Lagragnian trajectories obtained from a direct numerical simulation of a turbulent sooting jet flame [Attili *et al.*, Direct and Large-Eddy Simulation 9, Springer, 2013] based on a high-order method of moments. The method adopts an operator splitting approach, which splits the deterministic processes (nucleation, surface growth and oxidation) from coagulation, which is treated stochastically. The purpose of this work is to assess the solution based on the moment method and to investigate the soot particle size distribution (PSD) that is not available in methods of moments. Nucleation and coagulation have the greatest effect on the PSD, therefore, various coagulation models are considered. Along each trajectory, one or more rapid nucleation events occur, affecting the shape of the PSD. It is shown that oxidation and surface growth affect the PSD quantitatively, but do not change the shape significantly.

Ahmed Abdelgadir
Clean Combustion Research Center, KAUST

Date submitted: 02 Aug 2013 Electronic form version 1.4