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Large Eddy Simulation of a Sooting Jet Diffusion Flame GUILLAUME BLANQUART, HEINZ PITSCH, Mechanical Engineering Department, Stanford University — The understanding of soot particle dynamics in combustion systems is a key issue in the development of low emission engines. Of particular importance are the processes shaping the soot particle size distribution function (PSDF). However, it is not always necessary to represent exactly the full distribution, and often information about its moments only is sufficient. The Direct Quadrature Method of Moments (DQMOM) allows for an efficient and accurate prediction of the moments of the soot PSDF. This method has been validated for laminar premixed and diffusion flames with detailed chemistry and is now implemented in a semi-implicit low Mach-number Navier-Stokes solver. A Large Eddy Simulation (LES) of a piloted sooting jet diffusion flame (Delft flame) is performed to study the dynamics of soot particles in a turbulent environment. The profiles of temperature and major species are compared with the experimental measurements. Soot volume fraction profiles are compared with the recent data of Qamar et al. (2007). Aggregate properties such as the diameter and the fractal shape are studied in the scope of DQMOM.

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