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Stochastic Particle Advection in Hybrid Large Eddy Simulation/Filtered Density Function Methods PAVEL P. POPOV, STEPHEN B. POPE, Sibley School of Mechanical and Aerospace Engineering, Cornell University — We describe an efficient combination of interpolation and stochastic time integration schemes for the advection of computational particles in Large Eddy Simulation/Filtered Density Function (LES/FDF) methods. In this setting, particle positions evolve by a standard diffusion process whose drift and diffusion coefficients are determined from flow properties which are known in the form of face- and cell-average values. We demonstrate that a stochastic time integration scheme, developed by Cao and Pope in 2003, yields second-order accurate values of the particle position density function, provided that the interpolation schemes used reconstruct the diffusion and drift terms with second-order accuracy, and their first derivatives with first-order accuracy. Here, we present a velocity interpolation scheme, called the Polar Parabolic Edge Reconstruction Method (PPERM), and a scalar interpolation scheme, called the Multilinear Gradients Method (MLG), which satisfy these requirements, and we compare the performance of the Cao & Pope SDE integration scheme with that of a weak second-order accurate derivative-free scheme proposed by Tocino and Vigo-Aguiar in 2002.

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