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Uncertainty quantification in Eulerian-Lagrangian models for particle-laden flows[1] VASILEIOS FOUNTOULAKIS, GUSTAAF JACOBS, San Diego State University, HS UDAYKUMAR, University of Iowa — A common approach to ameliorate the computational burden in simulations of particle-laden flows is to use a point-particle based Eulerian-Lagrangian model, which traces individual particles in their Lagrangian frame and models particles as mathematical points. The particle motion is determined by Stokes drag law, which is empirically corrected for Reynolds number, Mach number and other parameters. The empirical corrections are subject to uncertainty. Treating them as random variables renders the coupled system of PDEs and ODEs stochastic. An approach to quantify the propagation of this parametric uncertainty to the particle solution variables is proposed. The approach is based on averaging of the governing equations and allows for estimation of the first moments of the quantities of interest. We demonstrate the feasibility of our proposed methodology of uncertainty quantification of particle-laden flows on one-dimensional linear and nonlinear Eulerian-Lagrangian systems.

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