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Accelerated Stochastic Vortex Structure Method for Transport of Interacting Particles in Turbulent Flow[1] JEFFREY MARSHALL, KYLE SALA, FARZAD DIZAJI, The University of Vermont — Turbulent particle transport with RANS or LES methods typically requires an additional model for effect of subgrid-scale eddies on the particles. For non-interacting particles stochastic Lagrangian methods are widely used for this purpose, but these models yield poor results for interacting particles due to lack of spatial correlation in the random forcing terms. Traditional synthetic turbulence methods used for LES initial conditions are often too slow to be useful for particle transport, and they usually lack the vortex structures which are important for generation of particle clustering. In the current work, an accelerated stochastic vortex structure (SVS) method is proposed for generation of synthetic turbulence for transport of interacting particles. The SVS model is shown to yield flow measures, such as energy spectrum and velocity, acceleration and vorticity pdfs, in good agreement with DNS results and with relevant theory. When coupled to a discrete-element method (DEM) code for particle transport, the SVS model is observed to yield very accurate results for particle collision rate and other measures of particle interaction.

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