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Euler-Lagrange Simulations of Particle Interactions with Coherent Vortices in Turbulent Boundary Layers FERNANDO MORALES, Arizona State University, Tempe, AZ, IFTEKHAR NAQVI, Queens University, Kingston, Canada, KYLE SQUIRES, Arizona State University, Tempe, AZ, UGO PIOMELLI, Queens University, Kingston, Canada — The overarching interest of the current investigations is numerical modeling of particle entrainment and deposition near sandy beds as relevant to the problem of rotorcraft brownout. Numerical simulations are being performed using an Euler-Lagrange method. Solution of the incompressible gas-phase flow field is accomplished using a fractional-step numerical method; the particulate phase is advanced using Discrete Particle Simulation. The particular flow field of interest models a rotor wake and is comprised of coherent vortices embedded in a turbulent boundary layer. The particles, once suspended, interact with the coherent wake vortices characterizing the rotor flow, and with the finer scale turbulence generated near the ground. The primary objectives are two-flow. First, to gain insight into the particle-vortex dynamics that influence transport near the bed and, second, to advance understanding of the mesoscopic particle velocity field. The latter objective requires very large particle ensembles in order to recover an Eulerian description of the particle field, important to advancing other simulation strategies for two-phase flows. Predictions of the flows for a range of particle and flow parameters will be presented.

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