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Analysis of dense particulate flow dynamics using a Euler-Lagrange approach OLIVIER DESJARDINS, Mechanical Engineering, University of Colorado at Boulder, PERRINE PEPIOT, National Renewable Energy Laboratory — Thermochemical conversion of biomass to biofuels relies heavily on dense particulate flows to enhance heat and mass transfers. While CFD tools can provide very valuable insights on reactor design and optimization, accurate simulations of these flows remain extremely challenging due to the complex coupling between the gas and solid phases. In this work, Lagrangian particle tracking has been implemented in the arbitrarily high order parallel LES/DNS code NGA [Desjardins et al., JCP, 2008]. Collisions are handled using a soft-sphere model, while a combined least squares/mollification approach is adopted to accurately transfer data between the Lagrangian particles and the Eulerian gas phase mesh, regardless of the particle diameter to mesh size ratio. The energy conservation properties of the numerical scheme are assessed and a detailed statistical analysis of the dynamics of a periodic fluidized bed with a uniform velocity inlet is conducted.

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