Abstract Submitted
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Modeling particle-laden turbulent flows with two-way coupling using a high-order kernel density function method[1] TIMOTHY SMITH, XIAOYI LU, University of Illinois at Urbana-Champaign, REETESH RANJAN, Georgia Institute of Technology, CARLOS PANTANO, University of Illinois at Urbana-Champaign — We describe a two-way coupled turbulent dispersed flow computational model using a high-order kernel density function (KDF) method. The carrier-phase solution is obtained using a high-order spatial and temporal incompressible Navier-Stokes solver while the KDF dispersed-phase solver uses the high-order Legendre WENO method. The computational approach is used to model carrier-phase turbulence modulation by the dispersed phase, and particle dispersion by turbulence as a function of momentum coupling strength (particle loading) and number of KDF basis functions. The use of several KDF's allows the model to capture statistical effects of particle trajectory crossing to high degree. Details of the numerical implementation and the coupling between the incompressible flow and dispersed-phase solvers will be discussed, and results at a range of Reynolds numbers will be presented.

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