Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Near-wall effects for momentum, heat and mass transport in gas-particle suspensions at moderate Reynolds numbers[1] STEFAN RADL, FEDERICO MUNICCHI, Graz University of Technology, CHRISTOPH GONIVA, DCS Computing GmbH, CFDEMresearch GmbH — Understanding transport phenomena in fluid-particle systems is of primary importance for the design of large-scale equipment, e.g., in the chemical industry. Typically, the analysis of such systems is performed by numerically solving a set of partial differential equations modeling the particle phase and the fluid phase as interpenetrating continua. Such models require a number of closure models that are often constructed via spatial filtering of data obtained from particle-resolved direct numerical simulations (PR-DNS). In the present work we make use of PR-DNS to evaluate corrections to existing closure models. Specifically, we aim on accounting for wall effects on the fluid-particle drag force and the particle-individual Nusselt number. We then propose an improved closure model to be used in particle-unresolved Euler-Lagrange (PU-EL) simulations. We demonstrate that such an advanced closure should account for a dimensionless filter size, as well as a normalized distance from the wall. In addition, we make an attempt to model the filtered fluid velocity profile in wall-bounded suspension flows.

[1]The authors acknowledge funding from the European Commission through FP7 Grant agreement no. 604656, as well as VSC-3 and dcluster.tugraz.at

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Date submitted: 23 Jul 2016 Electronic form version 1.4