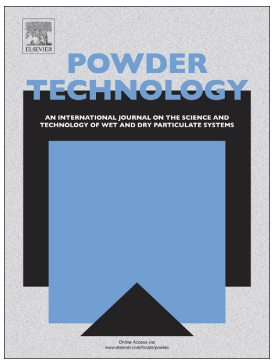


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PII: S0032-5910(18)30479-0
DOI: doi:10.1016/j.powtec.2018.06.039
Reference: PTEC 13472

To appear in: *Powder Technology*

Received date: 28 February 2018
Revised date: 14 May 2018
Accepted date: 25 June 2018

Please cite this article as: Xu Liu, Jinglin Su, Yanan Qian, Lijie Cui, Xiaoxing Liu , Comparison of two-fluid and discrete particle modeling of gas-particle flows in micro fluidized beds. Ptec (2018), doi:10.1016/j.powtec.2018.06.039

# Comparison of Two-Fluid and Discrete Particle Modeling of Gas-Particle Flows in Micro Fluidized Beds

Xu Liu[a,b], Jinglin Su[b], Yanan Qian[a,b], Lijie Cui[a*], Xiaoxing Liu[a,b,*]

[a]University of Chinese Academy of Sciences, Beijing 100049, China

[b]State Key Laboratory of Multi-phase Complex System, Institute of Process Engineering, Chinese Academy of Science, Beijing 100190, China

**Abstract**

The formation of a more porous zone in the near wall region has been commonly suggested to be one of the main mechanisms of the delayed onset of fluidization in micro fluidized beds (MFBs). If such geometrical effect still plays a major role once the bed is fluidized, it will challenge the applications of Two-Fluid Model (TFM) to simulate micro fluidized beds. In this work this issue is assessed by taking the simulation results of the Computational Fluid Dynamics coupled with the Discrete Element Method (CFD-DEM) as the benchmark data. Both the delayed onset of fluidization and the advanced onset of turbulent fluidization predicted by CFD-DEM simulations are successfully captured by the TFM simulations. The radial profiles of solids volume fraction and solids axial velocity predicted by TFM and CFD-DEM simulations are also in well agreement. Such results demonstrate that TFM can be appropriately used to model micro fluidized beds systems. Parameter analyses show that TFM simulation results are closely related to the input parameter setting. The minimum bubbling velocity predicted by TFM simulations closely depends on the chosen value of frictional packing limit. And the specularity coefficient has a significant impact on the predicted solids flow behavior.

**Keywords:** Micro fluidized beds; CFD-DEM; Two-Fluid model; regime transition; boundary condition.

*Corresponding author email: xxliu@ipe.ac.cn (Xiaoxing Liu)

ljcui@ucas.ac.cn (Lijie Cui)