# MODELING THE GAS-SOLID FLOW IN DIAMETER-CHANGING FLUIDIZED BEDS

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Gas-solid diameter-changing fluidized beds are usually used as either a transition section between the two parts with various diameters in circulating fluidized bed systems or a type of independent reactor in many industrial processes. This study focuses on the multiscale modeling of the former including tapered and inverted tapered structures, whose computational complexities mainly lie in addressing the problems related to the continuous variations of superficial gas and solid velocities with height as well as much more significant wall effect in diameter-changing fluidized beds than that in constant-diameter ones. By utilizing the energy-minimization multi-scale (EMMS) theory, the steady-state modeling of this type of reactor is performed to compute the spatial heterogeneous distributions of hydrodynamic parameters. A coarse-grained discrete particle method (DPM) defined by the EMMS model is also deployed for the high resolution simulation of gas-solid diameter-changing fluidized beds, in order to gain an insight into the underlying mechanisms involved in the variation of this heterogeneity with operating conditions. Both the axial and radial heterogeneous distributions of hydrodynamic parameters such as solid velocity and concentration in this type of reactor are firstly predicted in this study, which provides a quantitative reference for the design and scale-up of the tapered or inverted tapered fluidized beds. This study can be expected to further enrich the theory of full-loop modeling of complex gas-solid processes with various geometries and sizes.