DEM-CFD simulations of fixed bed reactors with small tube to particle diameter ratios

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A new meshing method for fixed beds consisting of monodisperse spherical particles is presented. The particles are flattened near the particle?particle and particle?wall contact points, respectively, to avoid bad cell qualities. Compared to known methods from literature the modifications are so small that a subsequent correction of these modifications is not necessary. CFD simulations are performed for tube to particle diameter ratios of 3 ? *D*/*d* ? 10 in the laminar, transitional and turbulent flow regime and are compared with results from literature concerning porosity and pressure drop. The flow pattern within the bed is also investigated. The random fixed bed is generated with a DEM-code and the fluid domain is meshed with the commercial CFD code STAR-CCM+. The focus of this work is to verify, that physically correct results as well as meshes with a low number of cells and therewith short calculation time can be obtained with this new meshing method.

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