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**Direct numerical simulation of particulate flow via multigrid FEM techniques and the fictitious boundary method.** (English) [Zbl 1145.76406](#)

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Summary: Direct numerical simulation techniques for particulate flow by the fictitious boundary method (FBM) are presented. The flow is computed by a multigrid finite element solver and the solid particles are allowed to move freely through the computational mesh which can be chosen independently from the particles of arbitrary shape, size and number. The interaction between the fluid and the particles is taken into account by the FBM in which an explicit volume based calculation for the hydrodynamic forces is integrated. A new collision model based on papers by Glowinski, Joseph, Singh and coauthors is examined to handle particle-particle and particle-wall interactions. Numerical tests show that the present method provides a very efficient approach to directly simulate particulate flows with many particles.

**MSC:**

[76M10](#) Finite element methods applied to problems in fluid mechanics

[76D05](#) Navier-Stokes equations for incompressible viscous fluids

Cited in **1** Review  
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**Keywords:**

particulate flows; incompressible Navier-Stokes equations; multigrid; FEM; fictitious boundary method

**Software:**

[FEATFLOW](#)

**Full Text:** [DOI](#)

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