An Adaptive Fictitious-Domain Method for Quantitative Studies of Particulate Flow Problems

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Abstract: We present an adaptive fictitious-domain method to simulate the motion of rigid particles in viscous flows. Our algorithm is based on the stress-DLM approach proposed by Patankar *et al.* (2000). The consequent use of *adaptivity* (e.g. locally adapted meshes, adaptive quadrature) makes our method very efficient and accurate, especially in the case of moderate particle volume fractions. Quantitative studies of particulate flow problems become therefore feasible.

We validate our method by solving a well-known benchmark problem. The savings achieved by adaptivity are huge. To show the potential of our approach, the problem of accurate resolution of non-smooth particle geometries is addressed. Different models for particle/particle and particle/wall collisions are compared quantitatively.

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