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Particle number decomposition DEM parallel algorithm for particle laden flows ZHENGPING ZHU, University of Minnesota, Twin Cities; Xidian University, XIAOJING ZHENG, Xidian University, LIAN SHEN, University of Minnesota, Twin Cities — Domain decomposition is the most commonly used parallel algorithm in simulations of particle laden flows. However, there are two limitations of this algorithm. Firstly, particles are generally distributed unevenly over the different sub-domains in anisotropic flows, leading to problems of loading balance, especially when gravity effect is strong. Secondly, as particles naturally cross borders between sub-domains, passing values between sub-domains can be complicated. In this study, we develop a new particle number decomposition algorithm to overcome these two limitations. In this method, each core deals with almost the same number of particles to achieve excellent loading balance. We further develop a low storage method that can effectively store the particles information in each core, while substantially reducing the complexity of passing values among different cores. The new algorithm is easy to implement, and existing serial DEM algorithms remain unchanged in the parallel version. It also has high parallel efficiency and can compute millions of fully resolved particles.

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