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Editorial

Multiscale and Multiphase Computational Particle Technology

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Particles and particulate systems are widely encountered in various industrial applications which can be in the form of solid particles, liquid droplets, and gas bubbles. Their behaviour is extremely complicated with multiscale and multiphase interactions. Actually, particulate materials are the second largest phase, only less than water, handled by human beings and at least 70% of the final or intermediate products in engineering processes are particles. Therefore, advances in the understanding of particulate systems can bring tremendous economic benefits to the industry. However, the available knowledge for particulate systems is quite limited enormously due to the lack of experimental measurement techniques. The establishment of a theoretical system for particulate matters is still in its infancy. Advanced numerical modelling based on mathematical equations, regarded as an important branch of applied mathematics, provides an alternative and powerful tool to understand the fundamental science governing the particulate flows in order to optimize various processes in engineering.

Within the scope of the computational particle technology (CPT), numerical modelling offers much critical information that is almost not accessible via experimental measurements, such as the instantaneous distribution of each phases, species, and fields. The current special issue is dedicated to Multiscale and Multiphase CPT highlighting the current progress of this topic. The papers included in this special issue are collected through call for papers online, peer review, and final evaluation. Comprehensive numerical methods are presented including molecular dynamics simulation (MD), smoothed particle hydrodynamics (SPH), discrete element method (DEM), moving particle semi-implicit (MPS) method, and computational fluid dynamics (CFD). It is also delighted to see the successful application of SPH-DEM and CFD-DEM for more practical multiphase problems. The authors and reviewers are all active researchers in the CPT area. We thank them for their valuable contributions which clearly demonstrate the capability of numerical modelling for both fundamental understanding and industrial application. We would also like to thank the Editorial Office of Mathematical Problems in Engineering for their encouragement and support to produce this special issue.

Conflicts of Interest

The editors declare that they have no financial and personal relationships with other people or organizations that can inappropriately influence the work, and there is no professional or other personal interest of any nature or kind in any product, service, and/or company that could be construed as influencing the position presented in the manuscript in the special issue.

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