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Preface

Particle based modelling techniques have established itself as an important simulation tool within particle technology. Whereas in the past, single phase solid flows have been in the focus in both academia and industry. This is changing towards recognising that solid flows are in most cases part of much more complex multiphase particle/fluid flow situations. Recently, significant progress has been made on dealing with both multiple granular phases (including wide size distributions) and the inclusion of one or multiple fluid phases. Techniques for dealing with fluids phases include mesh-based CFD, Smoothed Particle Hydrodynamics (SPH) and Lattice Boltzmann Methods (LBM). However, dealing with wide-size distributions and fluid phases remains a distinct challenge. Additionally, the addressable scales have broadened allowing for coarse grained descriptions, ensuring to address larger, nearly industrial scale systems, down to very detailed approaches, like Particle Resolved – Direct Numerical Simulations (PR–DNS). Moreover, research effort in the representation of realistic particle shapes is increasing. Furthermore, from an industrial design perspective, modelling of the interface between the phases and the equipment draws more and more attention, where additional Finite Element Method (FEM) and MultiBody Dynamics (MBD) couplings are needed for the design of the interface and equipment. Based on this, the number of applications of DEM in single and multiphase flow situations, both in academia and industry, has tremendously grown. To achieve realistic simulations on an industrial scale, parameter calibration requires attention; standardised calibration procedures have not yet been established for granular flow let alone for multiphase flow.

The aim of this special issue in *Particuology* is to report on the latest developments regarding methodologies and applications that elevate DEM from the research level to the industrial level where it can be used as a design tool for equipment and processes involving single solid as well as multiphase flows. This special issue highlights the latest advances in this field as presented within the 8th International Conference on Discrete Element Methods (DEM8).

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