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# Coupling DigiDEM and LBM for fluid-particle interactions

Xiaodong Jia\*<sup>1</sup>

<sup>1</sup>University of Leeds – School of Process, Environmental and Materials Engineering, University of Leeds, Leeds LS2 9JT, UK, United Kingdom

## Abstract

DigiDEM is a digital (i.e., voxel based) implementation of the Discrete Element Method. It is specifically designed to handle real particle shapes which are often irregular, complex and/or porous. The shapes are treated as 3D images. Such digital representation has two main advantages for complex shapes. First, data from modern and image-based particle sizer and/or shape analysers can be used directly, since the data are already in an image format. There is no requirement for re-meshing or re-modelling, the latter often involves reduction in details. In fact, the input shape/structure can be as precise as the machine can measure. Secondly, collision and overlap detection is relative straightforward since at least in concept it involves only voxel-level Boolean operations. This makes the coding relatively simple and easy, and the runtime speed high. Recently, efforts are being made to couple DigiDEM with LBM for estimation of drag forces acting on particles in fluid. The coupling is two-way: fluid flow influences how particles move, and particle movements in turn affect the flow field. Some details and examples of this on-going development will be given at the workshop.

**Keywords:** Digital, particle shape, DEM, LBM

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\*Speaker