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# COMBINED FINITE-DISCRETE ELEMENT METHODS FOR MULTI-BODY DYNAMICS AND FRACTURE MECHANICS - 1200

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## ABSTRACT

Algorithms for the combined finite-discrete element method (FDEM) started to be proposed from the 90s. Extensive developments and applications of the FDEM method have been carried out after the release of the open source Y-code in [1], and different versions have been released, including the code developed from the collaboration between Queen Mary University and Los Alamos National Laboratory [2, 3], the Y-Geo and Y-GUI software that have been developed by the Geomechanics Group led by Giovanni Grasselli at Toronto University [4, 5], and VGeST (Virtual Geoscience Simulation Tools) released by the Applied Modelling and Computation Group (AMCG) at Imperial College London [6, 7]. Recently the AMCG has upgraded and renamed VGeST as 'Solidity'. A commercial FDEM code developed by Geomechanica (www.geomechanica.com), has also been released in Canada, although its application has been limited to modelling geomaterials. While the first Y-code employed finite strain elasticity coupled with a smeared crack model to capture deformation, rotation, contact interaction and fragmentation, the AMCG has greatly improved the code, implementing a range of constitutive models in 3D [8, 9], thermal coupling [10], parallelisation and a faster contact detection algorithm [11].

The aim of the proposed mini-symposium is to showcase the current state-of-the-art of FDEM technology and to disseminate the latest research developments and cutting-edge methods for multi-body and fracture simulations with combined finite-discrete element methods. This mini-symposium will cover fundamental and applied research areas on topics including but not limited to:

- Numerical algorithms and optimisation techniques for combined finite-discrete element methods;
- Validation studies of multi-body and fracture simulations with experimental results;
- Coupling methods and applications for multi-physics (e.g. fluid and thermal) structural problems;
- Chemical and pharmaceutical applications (powder compaction, tableting, reactors, etc.);
- Civil and mechanical applications (track ballast, tunnelling, mechanical components, etc.);
- Rock mechanics, petroleum and mining applications (underground excavations, hydraulic fracturing, $CO_2$ sequestration, etc.).

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