



## University of Liverpool - Division of Civil Engineering

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Tuesday 14 July 2020 12.00 BST (13.00 CET)

### MULTISCALE MODELING OF GRANULAR MEDIA

*Dr. Jidong Zhao, Hong Kong University of Science and Technology*

#### ABSTRACT

Granular media are ubiquitous on the Earth and intimately related to our daily life. They are the second most processed materials (next to water) in the world. Granular media are typically porous, discrete media and exhibit intricate behavior of both solids and fluids depending on the loading conditions. Understanding of the mechanics and physics of granular media is of pivotal importance to a wide range of engineering and industrial sectors, yet it remains one of the most challenging scientific questions to be fully answered. In this talk, we introduce our continuous efforts over the past 12 years at HKUST on computational multiscale modelling of granular media towards more comprehensive and deeper understanding of granular media as an engineering science. The limitations of both conventional continuum modeling approaches and purely discrete-based modeling approaches on granular media simulations are first discussed. A coupled continuum-discrete approach for multiscale modeling of granular media is then introduced. We demonstrate the advantage in combining the strengths of both conventional continuum and purely discrete methods and in providing cross-scale understanding of key granular responses and phenomena in an engineering setting, including strain localization, liquefaction, failure and large deformation. We further introduce our recent efforts in modeling the complex grain shape, grain crushing, particle-fluid interactions which can find wide and important engineering relevance in civil, mining, chemical, coastal and offshore engineering, agriculture and pharmaceutical industry. The talk will cover developments of prevailing computational methods such as finite element method (FEM), material point method (MPM), discrete element method (DEM), nonlinear contact dynamics (NLCD) and physics engine (PE).

#### SPEAKER BIO

Dr. Jidong Zhao is Professor of Computational Geomechanics in the Department of Civil and Environmental Engineering at Hong Kong University of Science and Technology. Dr. Zhao focuses his research on multi-scale, multi-physics modeling of granular media pertaining to applications in geotechnical engineering, mining, petroleum and chemical engineering, pharmaceuticals and powder technology.

For more information, please visit his homepage: [jzhao.people.ust.hk](http://jzhao.people.ust.hk)



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