Contribution ID: **615** Type: **Poster (+) Presentation**

Microstructural Evolution of Sand Assembly in Direct Shear Test: An Experimental Study using X-Ray Tomography

Wednesday, 2 June 2021 09:00 (1 hour)

The macroscopic mechanical behaviour of granular-porous media is largely influenced by kinematics of its micro-mechanical counterparts of particles and pores. Deformation at particle-level is not uniform across a granular sample but is localized along the directional force chain, thus forming shear intensive failure surface known as shear zone. This results in complex internal failure mode and therefore, judgements from surface deformations using digital imaging techniques may be misleading. With the aid of 3D imaging techniques, microscopic variation at the particulate level can be studied. This study presents the localized evolution of the microstructural particle and pore properties in sand assemblies with different particle sizes. Direct shear test is conducted on two sand specimens with different particle sizes inside an x-ray scanning environment. The scanned images at various stages of the tests are pre-processed using algorithms implemented in MATLAB. The micro-scale properties of particle and pore data [1] are extracted from each scanned image. For analysing the localized evolution of microstructure during shearing, the stacked data of both specimens are studied using SPAM [2]. The influence of particle size on the evolution of microstructural particle and pore properties and consequently on macroscopic response of the specimen is investigated in detail.

Time Block Preference

Time Block A (09:00-12:00 CET)

References

1. Roy, N., & Frost, J. D. (2021). Characterizing the three-dimensional pore space architecture of granular materials. Under Review In Computers and Geotechnics
2. Stamati et al., (2020). spam: Software for Practical Analysis of Materials. Journal of Open Source Software, 5(51), 2286, https://doi.org/10.21105/joss.02286

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Primary author: Mr KANDPAL, Lalit (Indian Institute of Technology, Delhi)

Co-authors: GAUTAM, Anurag (Department of Civil Engineering, Indian Institute of Technology Dehli); Ms ROY, Nimisha (Georgia Institute of Technology); Dr MATSUMURA, Satoshi (Port and Airport Research Institute); Prof. VANGLA, Prashanth (Indian Institute of Technology Delhi); Prof. FROST, J. David (Georgia Institute of Technology)

Presenter: Mr KANDPAL, Lalit (Indian Institute of Technology, Delhi)

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Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies