



Postdoctoral Openings in Granular Mechanics

Topic: Role of Particle Properties on Elastic and Inelastic Behavior of Sand

Particulate media are among the most complex, yet intriguing, systems in technology. Consisting of loose assemblies of discrete units, their behavior radically transforms as a function of ambient pressure, packing density, contact topology, and particle shape. Much of this complexity originates from interactions among their constituents, as well as from the cross-scale propagation of these interactions. In this project we focus on how the shape, bulk deformation, and contact properties of the particles making up granular media, as well as their statistical disorder, affect their material properties and how they may be harnessed to design new systems with targeted attributes. Two postdoctoral positions are about to be opened in the Geomechanics Modeling Group at Northwestern University, both aimed at creating a diversified team exploring this intriguing topic. Both positions will focus on the multi-scale behavior of granular solids, with one emphasizing numerical and theoretical modeling of the particle-continuum duality of granular materials (as well as associated skills, such as Discrete Element Modeling and Continuum Mechanics) and the other emphasizing the experimental study of particulate materials. with advanced characterization protocols (e.g., X-Ray computed tomography, Digital Image Analysis, and geomechanical testing).

Position Descriptions

The selected candidates will work under the supervision of Prof. Giuseppe Buscarnera, with the joint co-supervisions of other faculty members at Northwestern (i.e., Prof. Sinan Keten for the computational project and Prof. Oluwaseyi Balogun for the experimental project). Both positions involve a one-year appointment, with the possibility of a contract extension after this period. For the project focusing on computational modeling, the selected candidate is expected to conduct numerical analyses with a variety of continuum and discrete methods (e.g., FEM, DEM, MD) and implement dedicated algorithms specialized at addressing the project objectives. For the project focusing on experimental activities, the selected candidate is expected to conduct deformation experiments on both standard and miniaturized specimens of granular materials, using X-ray tomography for microstructure characterization, and split Hopkinson bar in conjunction with ultrasound for dynamic material characterization, interpret measurements through advanced data analysis, and assess and/or design potential testing equipment upgrades. Competitive salary, exposure to a dynamic international academic environment and opportunities for professional development will be essential elements of the employment conditions. While the two positions are considered separate and independent, opportunities for collaboration exist and candidates who feel qualified for either type of project are welcome to apply to both positions.

Selection Criteria

- PhD in Geomechanics, Mechanics, Applied Mathematics, Physics or related fields.
- Expertise in discrete and continuum numerical methods, such as DEM, Molecular Dynamics or FEM (Computational position).
- Expertise in static and/or dynamic geomechanical testing, x-ray tomography, and digital image analysis (Experimental position).
- Excellent preparation in solid mechanics and computer coding.
- Ability to work independently.
- Excellent communication skills.
- Ability to work in multi-disciplinary teams. Co-supervision of Ph.D. students is expected.

How to Submit Your Application

Please, forward a single PDF consisting of a 1-page cover letter, a curriculum vitae, contacts of two references and two representative publications to Prof. Giuseppe Buscarnera (g-buscarnera(at)northwestern.edu). While submitting your package, please specify if you are applying to only one of the openings or both. For additional information you can contact the above email address or visit the website <http://www.civil.northwestern.edu/people/buscarnera/>.

Selection Process

Review of candidates will begin August 15th, 2022. Applications will be accepted until the position is filled.