Harkirat Singh

Contact Information

Solid Mechanics
Brown University
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Research Interests

Computational Mechanics

Education

Brown University
Ph.D. in *Solid Mechanics* 2018 - present
MS in *Solid Mechanics* 2018
Advisor: Prof. David Hennan

Indian Institute of Technology (IIT), Kanpur
Bachelor's and Master's (Dual degree) in *Mechanical Engineering* 2016
Advisors: Prof. Pankaj Wahi

Research Experience

Graduate Student Researcher 2018 - present
Advisor: Prof. David Henann
Solid Mechanics, Brown University

Research Assistant 2016-17
Advisor: Prof. Venkatesan
Department of Aerospace, IIT Kanpur

Research Assistant 2015-16
Advisor: Prof. Pankaj Wahi
Mechanics & Applied Mathematics Group, IIT Kanpur

Awards / Honors

Poster award at SES conference 2021
President Fellowship at Brown University 2017-20
4 year Doctoral fellowship at UBC (**not pursued*) 2017
Cambridge India Ramanujan Scholarship (**not pursued*) 2017

Working Papers

Pressure sensitive non-local behaviour in hydrogel suspension, with Zohreh Farmani and Nazanin Ghods

A predictive continuum model for coupled size segregation and flow in dense granular materials, with Daren liu and David Henann.

Finite element implementation of segregation dynamics coupled with nonlocal granular rheology , with Shihong Li and David Henann

Journal Publications

Harkirat Singh and Pankaj Wahi. *Non-planar vibrations of a string in the presence of a boundary obstacle*. Journal of Sound and Vibration, 389, 326-349.[PDF]

Harkirat Singh and Pankaj Wahi. *Role of curvatures in determining the characteristics of a string vibrating against a doubly curved obstacle*. Journal of Sound and Vibration, 402, 1-13. [PDF]

Conferences

Society of Engineering Science (SES) Annual Meeting, Texas, US. *Talk*. 2022
Gordan Reserch Conference, Granular Matter, Stonehill college, US. *Poster*. [Poster] 2022
American Physics Society (APS) March Meeting, Chicago, US. *Talk*. [Link] 2022
Society of Engineering Science (SES) Annual Meeting. *Virtual*. [Poster] 2021
9th European Nonlinear Dynamics Conference, Budapest, Hungary. *Talk*. [Paper] 2017
International Congress of Theoretical and Applied Mechanics , Montreal, Canada. [Poster] 2016
International Conference on Structural Nonlinear Dynamics and Diagnosis, Marrakesh, Morocco. *Talk*. [Paper] 2016
International Conference on Advances in Dynamics, Vibrations and Control, NIT Durgapur, India. *Talk*. [Paper] 2016

PhD Thesis

Constitutive modeling for size segregation and flow in granular materials (May' 18 - Present)
Supervisor: David Henann, Brown University

- Developed continuum scale model that predicts segregation and flow simultaneously
- Developed finite deformation plasticity framework and implemented as Abaqus UEL
- Performed discrete element modeling (DEM) simulations to test the continuum model

Masters Thesis

Modeling the dynamics of the string vibrating against a rigid obstacle
Supervisor: Pankaj Wahi, IIT Kanpur (May '15 - Jul '16)

- Used extended Hamilton's principle to derive the equations of motion and Galerkin projection method to discretize the system .
- Used Floquet theory to perform the stability analysis of nonlinear equations with periodic coefficients.

Technical Skills

Computational: Finite element analysis, Structural analysis, Numerical methods, Molecular dynamics.

Programming languages: MATLAB, Python, Fortran, C.

Softwares: Abaqus, Lammps, Mathematica, Ovito, Maple.

Teaching Experience

Teaching assistant for Advanced Solid Mechanics (ENGN 1750) (Sep '20 - Dec '20)
Teaching assistant for Mechanics of Solids and Structures (ENGN 0310) (Sep '19 - Dec '16)

Relevant Courses

Continuum Mechanics	Solid Mechanics
Computational Mechanics	Plasiticity
Fracture Mechanics	Stress Waves in Solids
Non-Linear Vibration	Aeroelasticity

Reference

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Pradeep Guduru Email: pradeep_guduru@brown.edu
Professor, Solid Mechanics, Brown University
Daniel Harris Email: daniel_harris3@brown.edu
Professor, Fluid Mechanics, Brown University