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Engineering & Scientific Consulting

Shashank Agarwal, Ph.D.

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Professional Profile

Dr. Agarwal has expertise in solid mechanics, continuum mechanics, structural dynamics, design, and product development. He specializes in using a variety of computational tools, such as Finite Element Analysis (FEA) and Discrete Element Modeling (DEM) for modeling and analyzing various materials such as metals and multi-phase granular materials. He has also used the design of experiments, manufacturing, and a variety of computational and experimental techniques to study complex natural and man-made systems.

Additionally, Dr. Agarwal holds a keen interest in the inclusion of science and technology in the development of larger-scale policymaking.

Dr. Agarwal performed his doctorate research at the department of mechanical engineering at MIT. His doctorate research focused on developing macro-scale methods for real-time modeling of granular intrusions applications such as vehicular and animal locomotion using advanced continuum modeling approaches.

Prior to his doctoral work, Dr. Agarwal worked as a scientist in the Defence Research and Development Organisation (India). In this position, he led the mechanical design and development of a variety of all-weather, low-cost, long-range surveillance systems that are continuously being used by the Indian Armed forces.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2022

M.S., Mechanical Engineering, Massachusetts Institute of Technology (MIT), 2019

B.Tech., Mechanical Engineering, Indian Institute of Technology, Gandhinagar, 2014

MathWorks Engineering Fellowships, 2021

Group Technology Award DRDO (India), 2016

Licenses and Certifications

Professional Engineer Mechanical, California, #42069

Prior Experience

Research Scientist, Defence Research and Development Organisation India, 2014-16

Professional Affiliations

American Physical Society (APS)

International Society For Terrain-Vehicle Systems (ISTVS)

Languages

Hindi

Publications

Agarwal S, Karsai A, Goldman DI, Kamrin K. Surprising simplicity in the modeling of dynamic granular intrusion. Science Advances. 2021 Apr 23;7(17):eabe0631.

Agarwal S, Karsai A, Goldman DI, Kamrin K. Efficacy of simple continuum models for diverse granular intrusions. Soft Matter. 2021;17(30):7196-209.

Schiebel PE, Astley HC, Rieser JM, Agarwal S, Hubicki C, Hubbard AM, Diaz K, Mendelson III JR, Kamrin K, Goldman DI. Mitigating memory effects during undulatory locomotion on hysteretic materials. Elife. 2020 Jun 24;9:e51412.

Agarwal S, Senatore C, Zhang T, Kingsbury M, Iagnemma K, Goldman DI, Kamrin K. Modeling of the interaction of rigid wheels with dry granular media. Journal of Terramechanics. 2019 Oct 1;85:1-4.

Randall GC, Dahal J, Vecchio J, Agarwal S, Mehta R, Ravichandran G, Stebner AP. Microcoining ripples in metal foils. International Journal of Mechanical Sciences. 2018 Nov 1;148:263-71.

Agarwal S, Sung RD. On the landscape of youth participation in science policy. MIT Science Policy Review 2, 2021, 2-7

Presentations

Agarwal, S. Reduced-order modeling of granular materials. International Society for Terrain-Vehicle Systems, September 2021 (Invited Talk)

Agarwal, S and McCormack K. Lead in Flint: A case study of the intimate relation between science and environmental policy. MITWATER. April 2021 (Invited Talk)

S Agarwal and K Kamrin. Efficacy of simple continuum models for diverse granular intrusions. Mechanical Engineering Research Exhibition MIT, MERE 2020 (Best Poster Award)

S Agarwal, A Karsai, D Goldman, K Kamrin. Understanding slipping of wheels in granular media locomotion and rate sensitive RFT. Engineering Mechanics Institute Conference, EMI 2019 (Best Poster Award)

S Agarwal, A Karsai, D Goldman, K Kamrin. Applicability of Resistive Force Theory in Design Optimization for Locomotion in Granular Beds. New.Mech 2018 (Presentation)

S Agarwal, A Karsai, D Goldman, K Kamrin. Understanding slipping of wheels in granular media locomotion. APS March Meeting 2019 (Presentation)

S Agarwal, A Karsai, D Goldman, and K Kamrin. Emergence of rate-dependent effects in rate-insensitive granular materials. International Fine Particle Research Institute, IFPRI 2019 (Poster)

S Agarwal, A Karsai, D Goldman, K Kamrin. Real-time granular locomotion optimization with Resistive force theory. New.Mech 2018 (Best Poster Award)

S Agarwal, A Karsai, D Goldman, K Kamrin. Locomotion Modelling in Granular Beds. Granular Matter Gordon Research Conference, GRC 2018 (Poster)

S Agarwal, A Karsai, D Goldman, K Kamrin. Applicability of Resistive Force Theory in Design Optimization for Locomotion in Granular Beds. Society of Engineering Science, SES 2017 (Presentation)

S Agarwal, A Karsai, D Goldman, K Kamrin. Improving granular locomotor path-planning with real-time empirical modeling. New.Mech 2017 (Presentation)

S Agarwal, A Karsai, D Goldman, K Kamrin. Applicability of Resistive Force Theory in design optimization for locomotion in granular beds APS March Meeting 2017 (Presentation)

R Sankar, S Agarwal, A Malladi, V Parameswaram. Behavior of thin walled cylinder in pulse loading: An experimental & numerical investigation. Presentation, Indian Society of Theoretical & Applied Mechanics, Pune, India 2012

Editorships & Editorial Review Boards

ISTVS, Scientific Committee, 2022

MIT Science Policy Review, Associate Editor, 2021

Peer Reviews

Journal of Terramechanics

IEEE Robotics and Automation Letters