RAUSHAN SINGH

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Assistant Professor ⋄ Department of Mechanical Engineering ⋄ IIT Madras India

RESEARCH INTERESTS

Analytical and Computational Solid Mechanics, Mechanics of Slender Structures, Nanomechanics, Sequence Dependent DNA Statistical Mechanics, Mathematical Optimization

PROFESSIONAL EXPERIENCE

Jul 2023 - Present	Assistant Professor, Department of Mechanical Engineering, IIT Madras, India
Feb 2019 - Jun 2023	Postdoctoral Associate, Institute of Mathematics, École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
Jul 2018	Guest Scientist, Institute of Applied Mechanics, Friedrich-Alexander University (FAU), Erlangen, Germany. *(for one month during Ph.D.)*

EDUCATION

Jan 2014 - Jan 2019	Ph.D., Department of Applied Mechanics, IIT Delhi, India *Awarded the Distinction in Doctoral Research*
Jul 2013 - Dec 2013	M.Tech., Department of Applied Mechanics, IIT Delhi, India *Converted to Ph.D. programme after first semester*
Jul 2007 - Jun 2011	B.Tech., Mechanical Engineering, Uttar Pradesh Technical University, Lucknow, India

PUBLICATIONS (IN INTERNATIONAL JOURNAL)

7. **Singh, R.**, Arora, A., & Kumar, A. (2022). A computational framework to obtain nonlinearly elastic constitutive relations of special Cosserat rods with surface energy. *Computer Methods in Applied Mechanics and Engineering*, 398, 115256.
6. Corazza, G. & **Singh, R.** (2022). Unraveling looping efficiency of stochastic Cosserat polymers. *Physical Review Research*, 4(1), 0130, 1-21.
5. **Singh, R.**, Tiwari, J., & Kumar, A. (2021). Self-contact in closed and open Kirchhoff rods. *International Journal of Non-Linear Mechanics*, 137, 103786.
4. **Singh, R.**, & Kumar, A. (2020). A singularity free approach for Kirchhoff rods having uniformly distributed electrostatic charge. *Computer Methods in Applied Mechanics and Engineering*, 367, 113133.
3. **Singh, R.**, Singh, P., & Kumar, A. (2019). Unusual extension–torsion–inflation couplings in pressurized thin circular tubes with helical anisotropy. *Mathematics and Mechanics of Solids*, 24(9), 2694-2712.
2. **Singh, R.**, Abhishek, D., & Kumar, A. (2018). An asymptotic numerical method for continuation of spatial equilibria of special Cosserat rods. *Computer Methods in Applied Mechanics and Engineering*, 334, 167-182.
1. **Singh, R.**, Kumar, S., & Kumar, A. (2017). Effect of intrinsic twist and orthotropy on extension-twist-inflation coupling in compressible circular tubes. *Journal of Elasticity*, 128(2), 175-201.

AWARDS

- Awarded the distinction in doctoral research by IIT Delhi (2019)
- Best poster award at Indo-German Workshop on Solid Mechanics at IIT Delhi (2018)
- Best poster award at open house event of IIT Delhi (2018)
- Financial grant by SERB India for attending an international event (Solvay workshop on mechanics of slender structures in physics, biology, and engineering, Brussels, Belgium, 2018)
- Research Excellence Travel Award by IIT Delhi to attend an international event (IMECE, PA, USA, 2018)

PRESENTATIONS (TALKS + POSTERS)

- cgNA+min: sequence-dependent energy minimisers of dsDNA minicircles, *Multiscale Simulations of DNA from Electrons to Nucleosomes, April 2023, Ascona, Switzerland*
- Sequence-dependent coarse-grained modeling of nucleic acids with applications to DNA minicircles, *Machine Learning Meets Statistical Mechanics: Success and Future Challenges in Biosimulations, October 2022, Sorrento, Italy*
- Jacobi conjugate points and computing end-to-end probability distributions for elastic Rods, *International Congress of Theoretical and Applied Mechanics, August 2022, Milan, Italy*
- Supercoiling of Kirchhoff rods under continuously distributed electrostatic charge and its application to DNA, *International Mechanical Engineering Congress and Exposition, November 2018, Pittsburg, USA*
- Unusual coupled deformation and supercoiling of biomolecules, *First Indo-German Workshop on Cutting Edge Research in Modern Mechanics, FAU, June 2018, Erlangen-Nurnberg, Germany*
- Unusual coupled deformation and supercoiling of biomolecules, *Solvay workshop on mechanics of slender structures in physics, biology, and engineering: from failure to functionality, August 2018, Brussels, Belgium*
- Unusual coupled deformation and supercoiling of biomolecules, *Indo-German workshop on solid mechanics, March 2018, IIT Delhi, New Delhi, India*
- Multiple topics from the project: Unusual coupled deformation and supercoiling in elastic rods with application to biomolecules, *during open house event of IIT Delhi (2015-2018), India*

TEACHING & SUPERVISION

EPFL	Principal assistant (2019-2022) for a master course mathematical modelling of DNA and a bachelor course Linear Algebra (2023). Supervised (jointly with postdoc advisor) a master's thesis and a master's report
IIT Delhi	Principal assistant for courses: computational mechanics, engineering mechanics, basic and advanced solid mechanics, solid mechanics laboratory, advanced finite element methods

EXTRACURRICULAR ACTIVITIES

- Student coordinator at Indo-German Workshop on Solid Mechanics (International Event, 2018)
- Second prize in Rocketile Competition at Tryst (Technical Event of IIT Delhi, 2017)
- Coordinator for Open House events of IIT Delhi (2014-2018)
- Assisted during PG-admissions in the Department of Applied Mechanics, IIT Delhi (2014-2016)