Rajesh Chaunsali

Curriculum Vitae

205, Department of Aerospace Engineering,
Indian Institute of Science, Bangalore-560012

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Research Interests

- Solid/structural mechanics
- Mechanics of advanced materials (e.g., metamaterials, granular media)
- Wave physics, vibration control, and instabilities

Educational History

Ph.D., Aeronautics and Astronautics 2014–2018
University of Washington, Seattle
Dissertation: Manipulating elastic waves in topological mechanical metamaterials
Advisor: Prof. Jinkyu 'JK' Yang

B.Tech. & M.Tech., Mechanical Engineering 2007–2012
Indian Institute of Technology Madras, Chennai
Minor in Physics

Employment History

Indian Institute of Science, Bangalore 2021–present
- Assistant Professor, Department of Aerospace Engineering

Laboratoire d'Acoustique de l'Université du Mans (LAUM), CNRS 2018–2021
- Postdoctoral Fellow (Advisor: Dr. Georgios Theocharis)

Laboratory for Engineered Materials and Structures, UW 2015–2018
- Graduate Research Assistant (Advisor: Prof. Jinkyu Yang)

General Electric, Bengaluru 2012–2014
- Edison Engineer in GE Aviation

Awards and Honors

- **Start-up Research Grant (SRG)**, Science and Engineering Research Board, India (2022)
- **Editor's Suggestion paper**, Physical Review Applied (2019)
- **Student Award Nominee: Research** for excellence in graduate research, College of Engineering, UW (2018)
- **Editor's Choice paper: Topological matter**, Scientific Reports (2018)
- **Conference Travel Support**, Aspen Center for Physics (2016)
- **Student Research Representative**, AeroAstro Visiting Committee, UW (2016)
- **Student Award Nominee: Teaching**, one of four nominees for excellence in teaching assistantship, College of Engineering, UW (2016)

- **S. Rao and Usha Varanasi Fellowship**, AeroAstro, UW (2015)
- **Graduate School Top Scholar Award**, UW (2014)
- **LEAD Expo Winner**, General Electric (2013)
- **Undergraduate Research Fellowship**, Indian Institute of Science (2009)
- **Mathematics Olympiad**, Silver medal, Chennai Mathematical Institute (2009)
- **Merit Scholarship**, Central Board of Secondary Education (2007–2011)
- **Regional Mathematics Olympiad**, State Rank 5 (2006)

Publications

Referred journal articles

(* Equally contributed first author)

1. Y. Miyazawa, C. Chen, **R. Chaunsali**, T. S. Gormley, G. Yin, G. Theocharis, J. Yang, "Topological state transfer in Kresling origami," *Communications Materials* 3, 1-10, 2022.
2. B.M. Manda, **R. Chaunsali**, G. Theocharis, C. Skokos, "Nonlinear Topological Edge States: from Dynamic Delocalization to Thermalization," *Physical Review B* 105, 104308, 2022.
3. A. Anastasiadis, G. Styliaris, **R. Chaunsali**, G. Theocharis, and F. K. Diakonos, "Bulk-edge correspondence in the trimer Su-Schrieffer-Heeger model," *Physical Review B* 106, 085109, 2022.
4. X. Shi, I. Kiorpelidis, **R. Chaunsali**, V. Achilleos, G. Theocharis, J. Yang, "Disorder-induced topological phase transition in a one-dimensional mechanical system," *Physical Review Research* 3, 033012, 2021.
5. C. Chen, **R. Chaunsali***, J. Christensen, G. Theocharis, J. Yang , "Corner states in a second-order mechanical topological insulator," *Communications Materials* 2, 1, 2021.
6. **R. Chaunsali**, H. Xu, J. Yang, P. G. Kevrekidis, G. Theocharis, "Stability of topological edge states under strong nonlinear effects," *Physical Review B* 103, 024106, 2021.
7. **R. Chaunsali**, G. Theocharis, "Self-induced topological transition in phononic crystals by nonlinearity management," *Physical Review B* 100, 014302, 2019.
8. C. Chen, N. Lera, **R. Chaunsali**, D. Torrent, J. Vicente Alvarez, J. Yang, P. San-Jose, J. Christensen, "Mechanical analogue of a Majorana bound state," *Advanced Materials* 31, 1904386, 2019.
9. E. Kim, **R. Chaunsali**, J. Yang, "Gradient-index granular crystals: From boomerang motion to asymmetric transmission of waves," *Physical Review Letters* 123, 214301, 2019.
10. X. Shi, **R. Chaunsali**, F. Li, J. Yang, "Elastic Weyl points and surface arc states in three-dimensional structures." *Physical Review Applied* 12, 024058, 2019 **(Editor's Suggestion)**.
11. **R. Chaunsali**, C. Chen*, J. Yang, "Experimental demonstration of topological waveguiding in elastic plate with local resonators," *New Journal of Physics* 20, 113036, 2018.
12. **R. Chaunsali**, E. Kim*, J. Yang, "Demonstration of accelerating and decelerating nonlinear impulse waves in functionally graded granular chains," *Philosophical Transactions of the Royal Society A* 376 (2127), 20170136, 2018 **(invited)**.
13. X. Shi, **R. Chaunsali**, Y. Wu, J. Yang, "Elastic Wannier-Stark ladders and Bloch oscillations in 1D granular crystals," *Journal of Applied Physics* 123, 104904, 2018 **(invited)**.
14. **R. Chaunsali**, C. Chen*, J. Yang, "Subwavelength and directional control of flexural waves in zone-folding induced topological plates," *Physical Review B* 97, 054307, 2018.
15. Y. Wu, **R. Chaunsali**, H. Yasuda, K. Yu, J. Yang, "Dial-in topological metamaterial based on bistable Stewart platform," *Scientific Reports* 8, 112, 2018 **(Editor's Choice)**.

16. **R. Chaunsali**, E. Kim*, A. Thakkar, P. G. Kevrekidis, J. Yang, "Demonstrating an in situ topological band transition in granular crystals," *Physical Review Letters* 119, 024301, 2017.

17. **R. Chaunsali**, M. Toles, J. Yang, E. Kim, "Extreme control of impulse transmission by cylinder based nonlinear phononic crystals," *Journal of the Mechanics and Physics of Solids* 107, 21-32, 2017.

18. **R. Chaunsali**, H. Xu*, J. Yang, P. G. Kevrekidis, "Linear and nonlinear dynamics of isospectral granular chains," *Journal of Physics A: Mathematical and Theoretical* 50, 175201, 2017.

19. **R. Chaunsali**, F. Li, J. Yang, "Stress wave isolation by purely mechanical topological phononic crystals," *Scientific Reports* 6, 30662, 2016.

20. E. Kim, **R. Chaunsali**, H. Xu, J. Castillo, J. Yang, P. G. Kevrekidis, A. F. Vakakis, "Nonlinear low-to-high frequency energy cascades in diatomic granular crystals," *Physical Review E* 92, 062201, 2015.

21. T. J. Royston, Z. Dai, **R. Chaunsali**, Y. Liu, Y. Peng, R. L. Magin, "Estimating material viscoelastic properties based on surface wave measurements: A comparison of techniques and modeling assumptions," *Journal of the Acoustical Society of America* 130 (6), 4126, 2011.

Manuscripts under preparation

1. **R. Chaunsali**, P. G. Kevrekidis, D.J. Frantzeskakis, G. Theocharis, "Dirac Solitons and Topological Edge States in the β-Fermi-Pasta-Ulam-Tsingou dimer lattice"

Other Scholarly Activity

Seminars and Invited talks

1. Seminar in the Department of Mechanical Engineering, IISc Bangalore, April 2022.
2. Symposium on Applied Mechanics and Dynamics, IIT Gandhinagar, March. 2022.
3. Seminar in the Department of Mechanical Engineering, University of Sheffield, UK, Dec. 2020 (online).
4. Seminar at Laboratoire d'Acoustique de l'Université du Mans (LAUM), CNRS, France, Dec. 2020 (online).
5. Seminar in the Department of Mechanical Engineering, Indian Institute of Technology Gandhinagar, Dec. 2019.
6. Seminar in the Department of Aerospace Engineering, Indian Institute of Space Science and Technology, Thiruvananthapuram, Dec. 2019.
7. Seminar in the Department of Physics, Indian Institute of Science Education and Research, Thiruvananthapuram, Dec. 2019.
8. Seminar in the Departments of Aerospace Engineering and Applied Physics, Indian Institute of Science, Bengaluru, Dec. 2019.
9. Seminar in the Departments of Mechanical and Aerospace Engineering, Indian Institute of Technology Madras, Chennai, Nov. 2019.
10. Seminar in the Department of Aerospace Engineering, Harbin Institute of Technology, Harbin, China, Jun. 2018.
11. AeroAstro Visiting Committee, University of Washington, Seattle, WA, Nov. 2016.
12. MAE Class, University of Washington, Seattle, Dec. 2015.

Conference presentations

1. "Nonlinear Dynamics of Topological Lattices," *European Nonlinear Oscillations Conference*, Lyon, France, July 2022.
2. "Topological mechanics and nonlinearity," *American Physical Society*, Online, Mar. 2021.
3. "Self-induced topological transition in a nonlinear phononic lattice," *Metamaterials*, Rome, Italy, Sept. 2019.

4. "Dynamic topological transition in a nonlinear phononic lattice," *International Congress on Ultrasonics*, Bruges, Belgium, Sept. 2019.
5. "Self-induced topological transition in a nonlinear phononic lattice," *Phononics*, Tucson, AZ, June 2019.
6. "Topological manipulation of stress waves by tunable 1D and 2D mechanical structures," *IUTAM Symposium on Acoustic/elastic Metamaterials, Their Design and Applications*, Beijing, China, Jun. 2018 **(invited)**.
7. "Subwavelength and directional topological waveguides in thin plates using pseudo spin Hall Effect," *American Physical Society*, LA, CA, Mar. 2018.
8. "Demonstrating in-situ topological band transition using highly tunable phononic crystals," *ASME-IMECE*, Tampa, FL, Nov. 2017.
9. "Extreme control of impulse transmission by cylindrical phononic crystals," *SIAM on Applications of Dynamical Systems*, Snowbird, UT, May 2017 **(invited)**.
10. "Experimental verification of topological band-transition in one-dimensional phononic crystals," *SPIE-Smart Structures/NDE*, Portland, OR, Mar. 2017.
11. "Manipulation of elastic waves in graded mechanical metamaterials," *ASME-IMECE*, Phoenix, AZ, Nov. 2016.
12. "Acoustic non-reciprocator based on topologically non-trivial band-gaps," *ASME-IMECE*, Phoenix, AZ, Nov. 2016.
13. "Unique Impact Mitigation Mechanism in Granular Dimer Chains," *ASME-IMECE*, Houston, TX, Nov. 2015.
14. "Numerical and experimental verifications of resonance and anti-resonance phenomena in granular dimer chains," *ASME-McMat*, Seattle, WA, Jul. 2015.

Professional Society Memberships

- APS: Americal Physical Society (2021 –)
- ASME: American Society of Mechanical Engineers (2015–2017)
- SIAM: Society for Industrial and Applied Mathematics (2017–2018)

Archival Journal Reviews

- Acoustics
- APL Materials
- Applied Physics Letters
- Communications Physics
- Crystals
- Extreme Mechanics Letters
- Journal of Applied Mechanics
- Journal of Applied Physics
- Journal of the Acoustical Society of America
- Journal of the Mechanics and Physics of Solids
- Journal of Vibration and Acoustics
- Nature Communications
- New Journal of Physics
- Physical Review Applied
- Physical Review B
- Physical Review E
- Physical Review Letters
- Scientific Reports
- Smart Materials and Structures
- Ultrasonics

Graduate Students and Post-Docs

Doctoral Degrees

- Harshith Kumar (Nov 2021 –)
- G. S. Srikanth (Jan 2022 –)
- Samanvay Anand (Feb 2022 –), Co-supervised by Prof. Vivek Dabade

Masters Degrees

- Udbhav Vishwakarma (Aug 2021 –)

Post doctoral Fellows

- Prabith K (June 2022 –)
- Anusree Ray (June 2022 –), Co-supervised by Prof. Vivek Dabade

Teaching Experience

Instructor, Indian Institute of Science Feb–April 2022

- Graduate-level core course on *Mathematical Methods for Aerospace Engineers*

Instructor, Le Mans University Feb–May 2020

- Masters-level course on *Introduction to Nonlinear Vibrations and Waves*

Instructor, University of Washington Aug–Sept 2018

- Led a study abroad course (AA 499: Design of novel materials and structures: a fusion of art, mathematics, and science) to Queensland University of Technology, Brisbane, Australia

Leadership and Service Activities

Leadership

- Student Research Representative, AeroAstro Visiting Committee, UW
- RA/TA panelist to welcome and council new graduates in AeroAstro, UW
- Student representative, Class of 2007, Mechanical Engineering, IIT Madras
- Editor, The Fourth Estate-Hindi (institute magazine), IIT Madras
- Captain, Dean's trophy cricket tournament, IIT Madras

Service

- Interview panelist for incoming research students, Structures, IISc Aero, Nov 2021
- Medal committee member, IISc Aero, Dec 2021
- Website committee member, IISc Aero, Jan 2022
- Interview panelist, Defense/DRDO sponsored MTech, May 2022
- Interview panelist for incoming research students, Structures, IISc Aero, May 2022
- Organizing and giving lab tours to external delegates in AeroAstro, UW
- Volunteer, National Service Scheme (NSS), India

Collaborators

- Panayotis Kevrekidis, University of Massachusetts, Amherst, USA
- Nicholas Boechler, University of California San Diego, USA
- Alexander Vakakis, University of Illinois, Urbana Champaign, USA
- Johan Christensen, Universidad Carlos III de Madrid, Spain
- Daniel Torrent, Universitat Jaume I, Spain
- Vassos Achilleos, CNRS, France
- Dimitri Frantzeskakis, National and Kapodistrian University of Athens, Greece

- Fotios Diakonos, National and Kapodistrian University of Athens, Greece
- Charalampos Skokos, University of Cape Town, South Africa
- Feng Li, Beijing Institute of Technology, China
- Eunho Kim, Jeonbuk National University, Republic of Korea

[Last updated: September 22, 2022. End of CV]