Abhigna Bhatt, PhD (She/Her)

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Research Summary

PhD in Civil Engineering from IIT Delhi (QS World Rank: 123), with 69 citations in 3.5 active research years. Published in top Q1 journals and holder of a patent on vibration isolation. Research focuses on wave dispersion, metamaterials, and nonlinear dynamics with applications in aerospace, infrastructure, and naval systems.

Experience

Research Experience

2025 January–2025 October — **Research Associate**, Indian Institute of Technology Delhi Conducting postdoctoral research on uncertainty quantification for wave dispersion in disordered metamaterial systems.

2014 January – 2017 December — **Research Assistant**, Indian Institute of Technology Gandhinagar Assisted in research labs and teaching for under graduate students in the field of structural engineering.

Teaching Experience

2018 September–2020 September — **Assistant Professor (TEQIP, NPIU)**, Jorhat Engineering College Taught Engineering mechanics, Engineering graphics and structural engineering subjects at UG and PG level. Supervised undergraduate projects in field of structural engineering.

2018 January–2018 August — **Assistant Professor (TEQIP, NPIU)**, Institute of Technology, Gopeshwar Delivered lectures for AutoCAD, taught Structural analysis to UG students, and managed labs in structural mechanics.

Industry Experience

2013 May–2013 December — **Assistant Engineer**, Surat Municipal Corporation Worked on infrastructure project execution, structural assessment, and coordination of public works.

Education

2020 –2025 — **Ph.D.**, (Date of Defense: 30 Jan 2025) Department of Civil Engineering, **Indian Institution of Technology Delhi (QS ranking:** 123^{rd} **in world,** 1^{st} **in India)**, New Delhi, India, Pin code-110016.**(CGPA: 9.5/10)**
Thesis title: *Wave dispersion characteristics in 1D metamaterial systems*

Education (continued)

2011 – 2013 **M.Tech. in Structural Engineering,** Applied Mechanics Department, National Institute of Technology Surat, Gujarat, India, Pin code-395007. **(CGPA: 8.5/10)**
Thesis title: *Reliability assessment and Performance based design of a RC frame.*

2007 – 2011 **B.Tech.,** Civil Engineering Department, National Institute of Technology Surat, Gujarat, India, Pin code-395007. **(CGPA: 8.05/10)**
Thesis title: *Neural Network Based Optimization Of Singly reinforced RCC Beam.*

2005 – 2007 **Higher Secondary,** • V. D. Desai (wadiwala) School, Surat, Gujarat, India, Pin code-395009 **(Percentage: 82.6 %)**

Research Interest

Wave Dispersion in Metamaterial | Nonlinear Dynamics | Structural health monitoring
Vibration mitigation | Structural Dynamics | Rigid Body Dynamics | Spectral Element Method
Finite Element Analysis | Uncertainty Quantification | Optimization techniques

Skills

Languages	Fluent in English, Hindi and Gujarati with strong reading, writing, and speaking skills.
Computation and Analysis	MATLAB, Python, COMSOL, MAPLE, MATHEMATICA, LabVIEW, MSExcel-VBA.
Equipments	Shaker system, 3D printer, Laser Doppler Vibrometer, High-speed camera.
Documentation	Microsoft Office, LaTeX.
Design Software	AutoCAD, Inkscape, Sketchup, Ultimaker Cura.

Awards

July 2024 Received **Research Excellance Travel Award** from IRD promotional funds, IIT Delhi to present work at 14th Conference on Metamaterials, Photonic Crystals and Plasmonics | Meta 2024, 16 to 19 July 2024, Toyama, Japan.

June 2024 Received **International Travel Support (ITS)** from Department Of Science & Technology (DST) to present work in "9th European Congress on Computational Methods in Applied Sciences and Engineering 2024 , Portugal (03 June, 2024 to 07 June, 2024)"

June 2023 Received **Research Student Travel Award (RSTA)** from IIT Delhi to present work in Phononics 2023 in Manchester, England, UK.

January 2022 Received **Superior Research Paper Award** at The International Conference on Futuristic Technologies 2021 held online during January 22-24, 2021

Research Publications

Publication Metrics

- Number of Journal Articles: 5
- Total Citations: 67
- h-index: 4
- i10-index: 3

Patents

- A. Banerjee, **A. Bhatt**, S. R. Patro. "Device For Absorbing Vibration," Indian Patent IN 202311027136, April 12, 2023 (Patent published).

Journal Articles

- **Bhatt, Abhigna**, and Arnab Banerjee. "Double attenuation peaks in metamaterial with simultaneous negative mass and stiffness." Physics Letters A 443 (2022): 128201. DOI: 10.1016/j.physleta.2022.128201 (SJR Q2, IF: 2.3, h-index: 194, citations: 27)
- **Bhatt, Abhigna**, Somya Ranjan Patro, and Arnab Banerjee. "Vibration isolation by relative resonance perceived in combination of rigid bodies and elastic beams." Journal of Sound and Vibration (2024): 118357.DOI: 10.1016/j.jsv.2024.118357. (SJR Q1, IF: 4.7, h-index: 222, citations: 18)
- **Bhatt, Abhigna**, and Arnab Banerjee. "Flexural wave propagation in rigid elastic combined metabeam." Journal of Vibration and Acoustics 145.1 (2023): 011006. DOI: 10.1115/1.4055174 (SJR Q1, IF: 1.9, h-index: 99, citations: 17)
- **Bhatt, Abhigna**, Arnab Banerjee, and Sondipon Adhikari. "Closed-form solutions for attenuation peaks and band boundaries of general monocoupled systems." Journal of Sound and Vibration 541 (2022): 117318. DOI: 10.1016/j.jsv.2022.117318. (SJR Q1, IF: 4.7, h-index: 222, citations: 5)
- **Bhatt, Abhigna**, and Arnab Banerjee. "Wave dispersion in a damped beam supported by cubic nonlinear springs: A multiscale freewave approach." Physical Review E 110, 044213 (2024) DOI: 10.1103/PhysRevE.110.044213. (SJR Q2, IF: 2.2, h-index: 271, citations: 0)

Conference Proceedings

- **Bhatt, Abhigna**, and Banerjee, A. "The Bandgap Characteristics of Wave Dispersion in Monocoupled Metamaterial." at 14th Conference on Metamaterials, Photonic Crystals and Plasmonics | Meta 2024, 16 to 19 July 2024, Toyama, Japan.
- **Bhatt, Abhigna**, and Banerjee, A. "Metadamping And Stiffness Nonlinearity Effects On Wave Dispersion In Beam On Cubic Nonlinear Foundation: A Method Of Multiscale." at 9th European Congress on Computational Methods in Applied Sciences and Engineering 3-7 June, 2024, Lisbon, Portugal
- **Bhatt, Abhigna**, and Arnab Banerjee. "Wave Dispersion in Beam on Cubic Nonlinear Foundation: A Method Of Multi Spatio-Temporal Scale." Poster Presentation at Interfacial Engineering Workshop, Indian Institute of Science, Mathikere, Bengaluru Urban, Bengaluru, India, January 29-31, 2024.
- **Bhatt, Abhigna**, and Arnab Banerjee. "Wave Dispersion in Monocoupled System with Inertial Amplifier and Embedded Resonator." Contributed talk at Phononics 2023: 6th International Conference on Phononic Crystals/Metamaterials/Metasurfaces, Phonon Transport, Topological Phononics. University of Manchester, Manchester, England, June 12-16, 2023.
- **Bhatt, Abhigna**, and Arnab Banerjee. "Flexural wave dispersion relationship of infinitely long elastic rigid combined beam." International conference on futuristic technologies, January 22-24, 2021. **Received superior research award**