Biswajit Bharat

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Research Experience

Indian Institute of Technology Kharagpur *Feb. 2022 - Present*
Assistant Professor, Department of Mechanical Engineering.

Project by DST - Russian Foundation for Basic Research *Jan. 2021 - Feb. 2022*
Position: Postdoctoral Fellow
Research Topic : Nonlinear Dynamics and Acoustics of Carbon Nano Tubes.

Indian Institute of Science, Bangalore *July. 2019 - July 2020*
Position: Institute Research Assistant
Research Topic : Multi frequency nonlinear sound structure interactions.

Awards

- **Gold Medalist :** Best PhD Thesis Award, IISc Bangalore
- **Merit Scholarship :** Undergraduate, IIT Guwahati (2012, 2014).

Academic Qualifications

Indian Institute of Science (IISc), Bangalore, India *Aug. 2014 – Feb. 2020*
Doctor of Philosophy in Mechanical Engineering
(Masters of Science in Engineering)
Thesis Topic : Resonances and beats in nonlinear structural acoustic waveguides.

Indian Institute of Technology Guwahati (IITG), India *Aug. 2010 – July 2014*
Bachelor of Technology in Mechanical Engineering
Thesis Topic : Experiments on Robot for virtual robotics lab.
A customized walking algorithm for the humanoid biped robot NAO was developed and implemented in the solid works model.

Research Publications

Peer Reviewed Journals

1. Resonance and beating phenomenon in a nonlinear rigid cylindrical acoustic waveguide: The axisymmetric mode
   Authors: **B. Bharat**, V. R. Sonti
   Journal: *Journal of Sound and Vibration*, Volume 458, 2019, Pages 262-275. Impact Factor: **3.655**
   doi: https://doi.org/10.1016/j.jsv.2019.06.025.

2. Self and cross-mode interactions in a weakly nonlinear two-dimensional structural-acoustic waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Journal: *The Journal of the Acoustical Society of America*, Volume 147(4), 2020, Pages 2499-2510.
   Impact Factor: **1.819**
   doi: https://doi.org/10.1121/10.0001079.

3. Nonlinear sound and structure interaction in a fluid–filled flexible waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Journal: *Wave Motion*, Volume 96, 2020, Pages 102577. Impact Factor: **2.02**
   doi: https://doi.org/10.1016/j.wavemoti.2020.102577.

4. Resonance and beating in a nonlinear flexible circular cylindrical waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Journal: *Journal of Sound and Vibration*, 2020, Pages 115857. Impact Factor: **3.655**
   doi: https://doi.org/10.1016/j.jsv.2020.115857.

Journals (To be submitted)

1. Multi-mode and multi-frequency interactions in a weakly nonlinear 2-D structural-acoustic waveguide.
   Authors: **B. Bharat**, V. R. Sonti
   Journal: To be submitted at *Journal of Sound and Vibrations*

International Conference Proceedings

1. Effect of nonlocal theory on the dynamics of carbon nanotubes
   Authors: **B. Bharat**, K. R. Jayaprakash
   Conference: 16^{th} *International Conference: Dynamical Systems Theory and Applications (Online)*, Dec. 6 –9 , 2021.

2. Dynamics of rotating cylindrical shell subjected to pressure loading
   Authors: P. Naga Vishnu, **B. Bharat**, K.R. Jayaprakash
   Conference: 16^{th} *International Conference: Dynamical Systems Theory and Applications (Online)*, Dec. 6 –9 , 2021.

3. Near resonant beating phenomenon in 2D nonlinear structural acoustic waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Conference: 7^{th} *International conference on theoretical applied computational and experimental mechanics*, IIT Kharagpur, Dec. 28–30, 2017, p. 217.

4. Multi-mode interactions in a nonlinear structural-acoustic cylindrical waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Conference: 47^{th} *Inter-Noise Congress and Exposition on Noise Control Engineering: Impact of Noise Control Engineering*, Chicago (Illinois), Aug. 26–29, 2018, paper no 1459.

5. Multi-mode nonlinear acoustic wave interactions in a rigid cylindrical waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Conference: 13^{th} *Western Pacific Acoustics Conference*, New Delhi, Nov. 11–15, 2018, p. 422.

National Conference Proceedings

1. Resonances in a nonlinear 2-D structural acoustic waveguide
   Authors: **B. Bharat**, V. R. Sonti
   Conference: 47^{th} *National Symposium on Acoustics*, Cuttack, Oct. 17–19, 2019.

2. Trajectory follower for Humanoid arm: planning and control
   Authors: S. K. Dwivedy, **B. Bharat**, A. Rahatgaonkar
   Conference: *National Conference on Recent Advancement in Mechanical Engineering (NCRAME-2013)*, NERIST Itanagar, Arunachal Pradesh, Nov. 8-9, 2013.

Research Areas

Vibration of shells	Sound-structure interactions
Acoustic meta-materials	Dynamics of Carbon nanotubes
Nonlinear vibrations	Vibration isolation

Vibro-acoustics learning demonstrations (Open Day IISc)

The chladni patterns

The vibrational modes of free edged rectangular and circular plates are visualised by vibrating them at their respective natural frequencies. The plate rearranges the nodal lines for each natural frequency and shows exciting patterns, revealing interesting information about itself. **Click here** to watch the experimental video (rectangular plate).

Getting a glass to crack using sound

The wine glass was acoustically excited at its natural frequencies for a longer time, resulting in the glass breaking. **Click here** to watch the experimental video.

Visualization of the 1-D acoustic wave

The various standing modes inside an acrylic tube were visualized by exciting one end at their natural frequencies.