

# KORAK SARKAR

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## RESEARCH INTERESTS

Structural Dynamics, Solid Mechanics, Rotary Wing Aeroelasticity, Analytical Modeling, Inverse Problems, Finite Element Analysis, Random Vibrations

## EDUCATION

<b>Doctor of Philosophy</b>	2016	Department of Aerospace Engineering <b>Indian Institute of Science, Bangalore, India</b> <u>Thesis</u> : Inverse problems in free vibration analysis of rotating and non-rotating beams and its application to random eigenvalue characterization <u>Advisor</u> : Prof. Ranjan Ganguli
<b>Master of Science (Engineering)</b>	2012	Department of Aerospace Engineering <b>Indian Institute of Science, Bangalore, India</b> GPA=6.5/8.0 <u>Thesis</u> : Closed-form solutions for rotating and non-rotating beams: an inverse problem approach <u>Advisor</u> : Prof. Ranjan Ganguli
<b>Bachelor of Engineering</b>	2009	Department of Mechanical Engineering <b>Jadavpur University, Kolkata, India</b> GPA=8.04/10.00

## PROFESSIONAL EXPERIENCE

<b>Assistant Professor</b>	Aug 2021 – Present	Department of Mechanical Engineering, <b>Indian Institute of Technology (IIT)</b> Kharagpur, India
<b>Temporary Faculty</b>	Nov 2020 – Jul 2021	Department of Aerospace Engineering & Applied Mechanics, <b>Indian Institute of Engineering Science &amp; Technology (IIEST)</b> , Shibpur, India
<b>SERB Indo-US Research Fellow</b>	Jan 2018 – Jan 2020	School of Aerospace Engineering, <b>Georgia Institute of Technology</b> , Atlanta, USA
<b>Research Associate</b>	Mar 2016 – Dec 2017	Department of Aerospace Engineering, <b>Indian Institute of Science (IISc)</b> Bangalore, India

## HONORS & AWARDS

- Prof Chintakindi V Joga Rao Medal for best PhD Thesis in the Department of Aerospace Engineering, Indian Institute of Science, Bangalore 2018.
- SERB Indo-US Postdoctoral Fellowship 2017-2018, by the Science and Engineering Research Board (SERB) & Indo-US Science and Technology Forum (IUSSTF), Govt. of India.
- International Travel Support-2014 by DST (Department of Science & Technology), Govt. of India.

## PUBLICATIONS

- Refereed Journal Papers = 11
- Conference Papers = 9

See **Appendix A** for list of publications

## EDUCATIONAL CONTRIBUTION

- PhD = 3 Ongoing
- Master's Thesis Project = 6 Completed, 3 Ongoing
- Taught several courses and labs

See **Appendix B** for details

## JOURNAL PAPER REFEREE

- AIAA Journal
- Applied Mathematical Modelling
- Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science
- Journal of Vibration Engineering & Technologies
- Proceedings of the Indian National Science Academy

## CONFERENCE COMMITTEE MEMBERSHIPS

- Organizing Committee, International Webinar on “Advances in Aerospace Engineering”, IEST Shibpur, March 19-20, 2021

## APPENDIX A: LIST OF PUBLICATIONS

### REFEREED JOURNAL PUBLICATIONS

1. **K. Sarkar** & R. Ganguli, “Rotating beams and non-rotating beams with shared eigenpair for pinned-free boundary condition”, *Meccanica*, Vol. 48, No. 7, pp. 1661-1676, 2013
2. **K. Sarkar** & R. Ganguli, “Closed-form solutions for non-uniform Euler-Bernoulli free-free beams”, *Journal of Sound and Vibration*, Vol. 332, No. 23, pp. 6078-6092, 2013
3. **K. Sarkar** & R. Ganguli, “Tailoring the second mode of Euler-Bernoulli beams: an analytical approach”, *Structural Engineering and Mechanics*, Vol. 51, No. 5, pp. 773-792, 2014
4. **K. Sarkar** & R. Ganguli, “Modal tailoring and closed-form solutions for rotating non-uniform Euler-Bernoulli beams”, *International Journal of Mechanical Sciences*, Vol. 88, pp. 208-220, 2014
5. **K. Sarkar** & R. Ganguli, “Closed-form solutions for axially functionally graded Timoshenko beams having uniform cross-section and fixed-fixed boundary condition”, *Composites Part B: Engineering*, Vol. 58, pp. 361-370, 2014
6. **K. Sarkar** & R. Ganguli, “Analytical test functions for free vibration analysis of rotating nonhomogeneous Timoshenko beams”, *Meccanica*, Vol. 49, No. 6, pp. 1469-1477, 2014
7. **K. Sarkar**, R. Ganguli, D. Ghosh & I. Elishakoff, “Closed-form solutions and uncertainty quantification for gravity-loaded beams”, *Meccanica*, Vol. 51, No. 6, pp. 1465-1479, 2016
8. **K. Sarkar** & R. Ganguli, “Benchmark analytical solutions from beams with shared eigenpair”, *International Journal of Mechanical Sciences*, Vol. 106, pp. 245-253, 2016
9. **K. Sarkar**, R. Ganguli & I. Elishakoff, “Closed-form solutions for non-uniform axially loaded Rayleigh cantilever beams”, *Structural Engineering and Mechanics*, Vol. 60, No. 3, pp. 455-470, 2016
10. S. Bhat, **K. Sarkar**, R. Ganguli & I. Elishakoff, “Slope-inertia model of non-uniform and inhomogeneous Bresse-Timoshenko Beams”, *AIAA Journal*, Vol. 56, No. 10, pp. 4158-4168, 2018
11. **K. Sarkar**, R. Ganguli, D. Ghosh & I. Elishakoff, “Random eigenvalue characterization for free vibration analysis of axially-loaded Euler-Bernoulli beams”, *AIAA Journal*, Vol. 56, No. 9, pp. 3757-3765, 2018

## INTERNATIONAL CONFERENCE PUBLICATIONS

1. **K. Sarkar** & R. Ganguli, "Modal tailoring and closed-form solutions for rotating beams", *Proceedings of the 69th American Helicopter Society Annual Forum*, Phoenix, Arizona, USA, May 21-23, 2013
2. **K. Sarkar** & R. Ganguli, "Closed-form Solutions for Rotating Non-homogeneous Timoshenko Beams", *Proceedings of the 39th European Rotorcraft Forum*, Moscow, Russia, September 3-6, 2013
3. **K. Sarkar**, R. Ganguli & I. Elishakoff, "Closed-form Solutions for Rotating Cantilever Non-uniform Rayleigh Beams", *Proceedings of the 3rd Asian-Australian Rotorcraft Forum*, Melbourne, Australia, December 18-19, 2014
4. **K. Sarkar**, R. Ganguli, D. Ghosh & I. Elishakoff, "Random Eigenvalue Analysis for the Free Vibration of Rotating Beams Using Inverse Problem Approach," *58th AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, Grapevine, Texas, USA, January 9-13, 2017
5. M. Gupta, **K. Sarkar** & D. Hodges, "3-D Stress-Strain Histories for Composite Beams under Nonlinear Transient Structural Analysis", *AIAA Scitech Forum & Exposition*, San Diego, California, USA, January 7-11, 2019
6. M. Gupta, **K. Sarkar** & D. Hodges, "Dynamic Analysis of Nonlinear Composite Beams with 3-D Structural Damping", *AIAA Scitech Forum & Exposition*, San Diego, California, USA, January 7-11, 2019
7. A. Das, S. Pal, **K. Sarkar** & A. Karmakar, "A Study on Vibration Characteristics of Cantilever Conical Shell Made of FG Sandwich Material with Porosity and Thermal Effect", *International Conference on Theoretical Applied Computational and Experimental Mechanics (ICTACEM)*, IIT Kharagpur, West Bengal, India, December 20-22, 2021
8. A. S. Rangari, I. Elishakoff & **K. Sarkar**, "Slope-inertia model for rotating Timoshenko-Ehrenfest beams," *Proceedings of the ASME 2023 Aerospace Structures, Structural Dynamics, and Materials Conference*, San Diego, California, USA, June 19-21, 2023
9. D. Dhar & **K. Sarkar**, "Free vibration analysis of rotating Rayleigh cantilever beam using p-type finite element method," *Proceedings of the ASME 2023 Aerospace Structures, Structural Dynamics, and Materials Conference*, San Diego, California, USA, June 19-21, 2023

## APPENDIX B: EDUCATIONAL CONTRIBUTIONS

### PHD STUDENTS

1. **Ravi Prakash Prajapati**, 2022-present
2. **Sahin Reja**, 2023-present (Jointly with Prof Goutam Chakraborty)
3. **Nitin Kumar Aman**, 2023-present (Jointly with Prof Anirvan Dasgupta)

### MTECH / DUAL DEGREE STUDENTS

1. **Ashishsingh Bharatbhai Solanki**, Dual Degree 2022  
*Topic: Reliability based design optimization of helicopter rotor blades*
2. **Joru Sai Kumar**, Dual Degree 2022  
*Topic: Inverse problem in multi-degree-of-freedom systems using Machine Learning*
3. **Vishal Saha Chowdhury**, Dual Degree 2022  
*Topic: Closed-form solutions for Rayleigh free-free beams using inverse problem approach*
4. **Apurva Sunil Rangari**, MTech, 2023  
*Topic: Slope-inertia Timoshenko beam model for rotating beams*
5. **Dipannoy Dhar**, MTech, 2023  
*Topic: Polynomial type finite element analysis for Rayleigh beams*
6. **Komati Eddy Nithin Reddy**, MTech, 2023  
*Topic: Functionally graded rotating beam modeling*
7. **Amzad Amin Rahul**, MTech, 2024  
*Topic: Wind turbine*
8. **Vignesh K**, MTech, 2024  
*Topic: Piezoelectric Energy harvesting*
9. **Pawar Ajinkya Anil**, MTech, 2024  
*Topic: Mechanics of metamaterials*

### TEACHING

#### Indian Institute of Engineering Science & Technology (IEST), Shibpur:

1. **Mechanics** (UG): *Autumn 2020-21*
2. **Drawing Practice** (UG): *Autumn 2020-21, Spring 2020-21*
3. **Fluid Mechanics Lab** (UG): *Spring 2020-21*

#### Indian Institute of Technology (IIT) Kharagpur:

1. **Dynamics** (UG): *Autumn 2021-22, 2022-23, 2023-24*
2. **Design & Dynamics Laboratory** (PG): *Autumn 2021-22, 2022-23, 2023-24*
3. **Do-it-Yourself (DIY) Project** (UG): *Autumn 2021-22, Spring 2021-22*
4. **Vibration of Structures** (PG): *Spring 2022-23*
5. **Basic Engineering Mechanics** (UG): *Spring 2021-22, 2022-23*
6. **Engineering Drawing & Computer Graphics** (UG): *Autumn 2021-22*