

TANMOY BOSE

Research Scholar
Department of Mechanical Engineering
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Educational Qualifications

Indian Institute of Technology Khargpur, West Bengal, India Synopsis given

Pursuing *Doctor of Philosophy* in Mechanical Engineering

Thesis Title: *Analytical and numerical models for vibro-acoustic studies of thin isotropic rectangular and circular cracked plates*

Advisor: Prof. Amiya Ranjan Mohanty

Jadavpur University, Kolkata, West Bengal, India Passed out year: 2010

Master of Engineering in Mechanical Engineering Marks: 85.5%

Thesis Title: *Determination of Ductile crack growth resistance curve For Nickel Molybdenum Steel and Its assessment with Crack Tip Triaxiality*

Advisor: Prof. Sankar Dhar & Dr. Sanjib Kumar Acharyya

Jalpaiguri Government Engineering College, West Bengal Passed out year: 2008

Bachelor of Technology in Mechanical Engineering Marks: 71.4%

Chittaranjan English Medium, West Bengal Passed out Year: 2004

Higher Secondary (10+2) Marks: 72.1%

Deshbandhu Vidyalaya (Boys'), West Bengal Passed out Year: 2002

Secondary (10th) Marks: 80.6%

Research Interests

- **Fracture Mechanics** Both numerical and experimental study has been carried out on cracked specimens ranging from problems involving crack propagation to vibration of cracked plates.

- **Nonlinear Vibration** I have worked on large deflection of plates.
- **Vibro-acoustics** I have worked on sound radiation from plates.

Project and Training:

- **PhD Thesis** Study of vibro-acoustics characteristics of cracked plate and also develop model based crack detection procedure. Both small and large amplitude vibration based models are developed. Side crack for small amplitude and surface crack for large amplitude vibration is considered. Models are validated with a finite element package (ABAQUS). Acoustic based non-contact monitoring model is also developed which is validated by LMS Virtual Lab.Acoustics.
- Three month **project** on “Acoustic monitoring of sodium boiling in a Liquid Metal Fast Breeder Reactor” at **CNRS Lab, Lille, France**. Experimental data at different operating conditions were available when there is no boiling in the reactor. Signal processing techniques were used to remove unwanted noises and then boiling signal obtained from an experiment was added to prepare test signal. Later, this test signal is processed by autoregressive model and support vector machines as classification techniques and principal component analysis as a data reduction technique. Finally, a boiling detection window is created for online boiling detection.
- **ME Thesis** Experimental determination of crack growth resistance curve of 20MnMoNi55 Steel which is validated by an approximate analytical analysis and finite element analysis. Critical fracture toughness was measured by three methods- ASTM, JSME and SZW. Also, crack tip triaxiality variation along the thickness of both compact tension (CT) and three point bend (TPB) specimens are determined by finite element method (using ABAQUS).
- **BTech** project work was based on Finite element method (FEM). An elastic, Plane stress problem was done using C language. I have also done an elastic analysis of a worm wheel (used in Durgapur Steel Plant) using ANSYS Software.
- Vocational training in Durgapur Steel Plant and a power plant (1 month each).

Publications

1. S. Bhowmick, A. Chattopadhyay, **T. Bose**, S.K. Acharyya, P. Sahoo, J. Chattopadhyay, S. Dhar, (2011) “Estimation of fracture toughness of 20MnMoNi55 steel in the ductile

- to brittle transition region using master curve method”, Nuclear Engineering and Design 241, 2831-2838.
2. **Tanmoy Bose**, A. R. Mohanty, (2013), “Vibration analysis of a rectangular thin isotropic plate with a part-through surface crack of arbitrary orientation and position”, Journal of Sound and Vibration 332(26), 7123-7141.
 3. **Tanmoy Bose**, A. R. Mohanty, (2014) “Detection and monitoring of side crack in a rectangular plate using Mobility”, Journal of vibration and control, 1-10.
 4. Issa Cherif Geraldo, **Tanmoy Bose**, Komi Midzodzi Pekpe, Jean Philippe Cassar, Amiya Rajan Mohanty, Kevin Paumel (2014) “Acoustic monitoring of sodium boiling in a Liquid Metal Fast Breeder Reactor from autoregressive models”, Nuclear Engineering and Design 278, 573-585.
 5. **Tanmoy Bose**, Issa Cherif Geraldo, Komi Midzodzi Pekpe, Jean Philippe Cassar, Amiya Rajan Mohanty, Kevin Paumel (2014) “Sodium boiling Detection in a LMFBR Using Autoregressive Models and SVM”, Fault detection and isolation, switching systems, discernability and distinguishability 1-6.
 6. **Tanmoy Bose**, A. R. Mohanty, “Sound radiation response of a rectangular plate having a side crack of arbitrary length, orientation and position”, Journal of Vibration and Acoustics *Transactions of ASME* (accepted).

Conferences

1. **Tanmoy Bose** and A. R. Mohanty, (2013) “Vibration analysis of a thin rectangular plate with an arbitrary oriented surface crack”, *58th Congress of ISTAM*, 18-21 December, Indian Institute of Science and Technology, Howrah, India, SM5, pp. 1-7.
2. **Tanmoy Bose**, I. C. Geraldo, K. M. Pekpe, J. P. Cassar, A. R. Mohanty, Kevin Paumel, (2014) “Boiling Detection in a LMFBR Using Autoregressive Models and SVM”, *19th IFAC World Congress*, August 24-29, Cape Town, South Africa, ThA21.2.

Software Knowledge:

ANSYS, ABAQUS, LMS Virtual Lab.Acoustics, MATLAB, MATHEMATICA.

Laboratory Equipments Used

- **Instron 8801** is used for tensile test and also experimental J-R (i.e., crack resistance) curve determination of CT and TPB specimens. Test temperature is also varied in an attached chamber from 40⁰C to -150⁰C by using liquid nitrogen and master curve is generated. Precracking was done by using a fatigue test.
- **OROS Signal Analyser, Impact Hammer (B&K 8202), Nexus charge amplifier (B&K 2690)** are used for modal testing of cracked plates.
- **PULSE signal Analyser, Microphone B&K 4136, Microphone power supply 2804** are used during the experiment on different steps of bubbles forming.

- **Low thrust Shaker (Sdyn SEV 180)** is used for testing of specimen in different types of loading as sine, shock, sine on random and arbitrary forcing profile.
- **Olympus omniscan Mx2** is used for ultrasonic testing of flaws.
- **Tinus & Olsen Universal Testing M/C** are used for testing of flat specimens and demonstration to undergraduate students.
- **Instron MT Torsion Testing M/C (capacity: 22.5 N-m & 225 N-m)** is used for demonstration of torsion test on cylindrical specimens to undergraduate students.
- **Instron Impact Testing M/C (both charpy and izod)** is used for demonstration purpose.
- **YOKOGAWA** is used for data acquisition and monitoring purpose.

Courses attended

- **Master Degree:** Mechanics of Composite, Mechanical Vibration, Fracture Mechanics, Finite element Method, Elasticity, Plasticity, Rotordynamics, Control, Optimization.
- **PhD:** Acoustics and Noise control, Machinery fault diagnosis and signal processing, Advanced strength of materials, Multi-scale modeling of advanced materials.

Honors and Awards

- Awardee of GATE (Graduate aptitude test in Engineering) fellowship 2008-2010 by UGC (University Grants Commission), India
- Institute fellowship at IIT Kharagpur 2010-2014

Extracurricular Activities:

1. PAINTING- It's remain my best hobby from childhood.
2. EXCURSION- I have a passion to go in remote places and for this excursion is suitable for me.

References:

A. R. Mohanty (Supervisor)
Professor of Mechanical Engineering

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R. N. Maiti (DSC member)
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Declaration:

I hereby declare that all the information provided above is true to the best of my knowledge.



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