Abhishek Kundu *Curriculum vitae*

CONTACT INFORMATION

College of Engineering
Swansea University
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PRESENT STATUS

Research Assistant in the Morphing Aircraft Project at the College of Engineering, Swansea University, UK since January 2014. Current research focusses on the uncertainty quantification in parametrized models of engineering systems arising from a lack or imprecise knowledge about the system parameters. The uncertainty analysis is performed within the Bayesian probabilistic framework with emphasis on the practical mechanical and aerospace applications. I completed my PhD in Aerospace Engineering in June 2014.

LANGUAGES

Bengali, English, Hindi, French (intermediate).

RESEARCH INTERESTS

Stochastic finite elements, Bayesian inference, Bayesian model calibration, Stochastic Partial Differential Equations, Probability Theory, Uncertainty Propagation methods, Structural Dynamics, Smart materials, Vibration Control, Adaptive Control, Noise Control, Acoustics, Random Vibration.

EDUCATION

Swansea University, Singleton Park, Swansea SA2 8PP, UK.

PhD, June 2014.
College of Engineering,

- Thesis Title: *Efficient uncertainty propagation schemes for dynamical systems with Stochastic Finite Element Analysis*
- Supervisors: Prof Sondipon Adhikari, Prof Michael I Friswell
- Area of Study: Uncertainty Propagation, Stochastic Finite Element Analysis

Université de Sherbrooke, Sherbrooke, Québec J1K 2R1, Canada.

M.Sc.A. (Master of Applied Science), August 2010
Department of Mechanical Engineering,

- Thesis Title: *Acoustic Isolation and Absorption with Smart Foams*
- Supervisor: Prof Alain Berry
- Area of Study: Active Noise and Vibration Control

Jadavpur University, Jadavpur, Kolkata 700032, India.

B.E. (Bachelor's Degree in Mechanical Engineering), August 2007
Mechanical Engineering Department

- First Class in Engineering
- Numerical method specialization (Finite Element Analysis)

ACADEMIC APPOINTMENTS

Research Assistant January 2014 – present
College of Engineering, Swansea University

- European Research Council (ERC) Advanced Grant
  - *Optimisation of Multi-scale Structures with Applications to Morphing Aircraft (Grant No. 247045)*
  - Supervisor : Prof Michael I Friswell

Refereed Journal Publications

A. Kundu, S. Adhikari and M. I. Friswell. Stochastic finite elements of discretely parametrized random systems on domains with boundary uncertainty. *International Journal for Numerical Methods in Engineering*. Accepted for publication (2014). doi:10.1002/nme.4733

A. Kundu, F. A. DiazDelaO, S. Adhikari and M. I. Friswell. A hybrid spectral and meta-modeling approach for the stochastic finite element analysis of structural dynamic systems. *Computer Methods in Applied Mechanics and Engineering*. Volume 270(0), pp. 201-219, (2014). doi:http://dx.doi.org/10.1016/j.cma.2013.11.013

A. Kundu and S. Adhikari. Transient Response of Structural Dynamic Systems with Parametric Uncertainty. *Journal Engineering Mechanics*. Volume 140(2), pp. 315-331, (2013). doi:10.1061/(ASCE)EM.1943-7889.0000643

A. Kundu and A. Berry. Active sound control with smart foams using piezoelectric sensoriactuator. *Journal of Intelligent Material Systems and Structures* Volume 22 No. 16, pp. 1771-1787 (2011). doi:10.1177/1045389X11409079

A. Kundu and A. Berry. Active control of transmission loss with smart foams. *Journal of the Acoustical Society of America*. Volume 129, Issue 2, pp. 726-740 (2011). doi:10.1121/1.3519676

Submitted Journal Articles

A. Kundu and S. Adhikari. Dynamic analysis of stochastic structural systems using frequency adaptive spectral functions. *Probabilistic Engineering Mechanics*, Manuscript ID: PREM-D-13-00111.

A. Kundu, S. Adhikari and M. I. Friswell. Transient response analysis of randomly parametrized finite element systems based on approximate balanced reduction. *Computer Methods in Applied Mechanics and Engineering*, Manuscript ID: CMAME-D-14-00795.

Book Chapters

A. Kundu and S. Adhikari. Stochastic structural dynamics using frequency adaptive basis functions *Proceedings of the International Symposium on Engineering under Uncertainty: Safety Assessment and Management (ISEUSAM - 2012)*, Edited by Subrata Chakraborty, Gautam Bhattacharya, to be published by Springer, 2013.

A. Kundu and S. Adhikari. A novel reduced spectral function approach for finite element analysis of stochastic dynamical systems *Computational Methods in Stochastic Dynamics: Volume 2* , Edited by Manolis Papadrakakis, George Stefanou, Vissarion Papadopoulos, published by Springer, 2012.

Conference Publications

A. Kundu, F. A. DiazDelaO, M. I. Friswell and S. Adhikari. Probabilistic sensitivity analysis of corrugated skins with random elastic parameters and surface topology, ASCE-ICVRAM-ISUMA 2014, University of Liverpool, Liverpool, UK. 13-16 July, 2014.

A. Kundu, F. A. DiazDelaO, M. I. Friswell and S. Adhikari. Uncertainty analysis of corrugated skin with random elastic parameters and surface topology, SciTech 2014 (AIAA), National Harbor, USA. 13-17 Jan, 2014.

A. Kundu and S. Adhikari. Transient Dynamics of Stochastic Systems using a Reduced Order Spectral Function Approach. 53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, April 2012, Honolulu, Hawaii.

A. Kundu and S. Adhikari. Finite Element Analysis of Stochastic Structural Dynamic Systems using a Reduced Order Spectral Function Approach. 6th International ASRANet Conference for Integrating Structural Analysis, Risk and Reliability. July 2012, London, Croydon (UK).

Novel Reduced Galerkin Projection Schemes for Stochastic Dynamical Systems. Proceedings of the 1st International Symposium on Uncertainty Quantification and Stochastic Modeling. February 2012, Maresias, Sao Sebastiao(SP), Brazil.

Stochastic Structural Dynamics using Frequency Adaptive Basis Functions. International Symposium on Engineering under Uncertainty: Safety Assessment and Management. January 2012, Kolkata (WB), India.

A. Kundu and S. Adhikari. A Novel Galerkin Projection Approach for Damped Stochastic Dynamic Systems. COMPDYN 2011, 3rd ECCOMAS Thematic Conference on Computational Methods in Structural Dynamics and Earthquake Engineering, Corfu, Greece, May 2011.

A. Kundu and S. Adhikari. A Reduced Spectral Projection Method for Stochastic Finite Element Analysis, 52nd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, April 2011, Denver, Colorado.

A. Kundu, A. Berry, P. Leroy, Active control of broadband noise using smart foams, Proceedings of ACTIVE 2009 International Symposium on Active Control of Sound and Vibration, organized by Institute of Noise Control Engineering-USA, Ottawa, 2009.

A. Berry, P. Leroy, A. Kundu, P. Herzog, N. Atalla, Acoustic absorption and isolation with smart foams (Absorption et isolation acoustique à laide de mousses actives); 10th French Congress of Acoustics, Lyon, France 2010.

THESIS

A. Kundu. *Efficient uncertainty propagation schemes for dynamical systems with Stochastic Finite Element Analysis*, PhD thesis, Swansea University, Swansea, United Kingdom, 2014.

A. Kundu. *Acoustic Isolation and Absorption with Smart Foams*. Master's thesis, Université de Sherbrooke, Sherbrooke, Québec, Canada, 2010.

PAPERS PRESENTED

Uncertainty analysis of corrugated skin with random elastic parameters and surface topology, SciTech 2014 (AIAA), National Harbor, USA. 13-17 Jan, 2014.

Stochastic Finite Element Method for dynamical systems with random boundary topology, 25th Biennial Conference on Numerical Analysis, University of Strathclyde, Glasgow, UK, June 25-28, 2013.

Stochastic finite element method for structural dynamics, 53rd AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics & Materials Conference, Honolulu (HI), USA. 23-26 Jan, 2012.

A reduced spectral function approach for stochastic transient dynamics, Workshop on "Linear Algebra Aspects of Solving PDEs with Random Data", School of Mathematics, University of Manchester, Manchester, UK; 9-10 Jan, 2012.

Active control of broadband noise using smart foams, ACTIVE 2009 International Symposium on Active Control of Sound and Vibration, organized by Institute of Noise Control Engineering-USA, Ottawa, Canada; 20-22 Aug, 2009.

REVIEWER SERVICE

- *Mechanical Systems and Signal Processing, Elsevier.*
- *Journal of Vibration and Control, SAGE.*
- *Applied Mathematical Modelling, Elsevier.*

AWARDS & ACHIEVEMENTS

⋆ Zienkiewicz Scholarship, Swansea University
- Aerospace Engineering, 2010–2013
- Full Support for PhD studentship (maintenance and full tuition fees).

⋆ Graduate Student Bursary, Université de Sherbrooke
- Mechanical Engineering, 2008–2010
- Full Support for M.Sc.A. studentship (maintenance and full tuition fees).

⋆ Achieved a rank in top 1% in the GATE Examination, India.
- Mechanical Engineering, 2008
- Graduate Aptitude Test in Engineering (GATE) is the only the national level examination for getting admission to postgraduate engineering studies in India.

EXPERIENCE

Research Assistant, Swansea University, Jan 2014 – Present
- Research topic: Uncertainty Quantification in engineering systems.
- Active control of aerodynamic divergence (flutter) in morphing aircraft wings.

Graduate Course Demonstator, College of Engineering, Swansea University, 2011-13.
- Engineering Analysis I EG189
- Engineering Analysis II EG190
- Dynamics I EG260
- Fluid Mechanics Laboratory EG125
- Scientific & Engineering Skills EG168
- Civil Laboratory III EG228

HARDWARE AND SOFTWARE SKILLS

Instrumentation, Control, Data Acquisition, Test, and Measurement:
- dSPACE hardware (e.g., RTI1104) and Control Desk software, Simulink, LabVIEW and other National Instruments control and data acquisition hardware and software (e.g., DSA, MIO, SMIO, DMM)

Computer Programming:
- C++, Python, Fortran, Maxima, Maple, MATLAB, Mathematica.

Productivity Applications:
- TEX (LATEX, BIBTEX, PSTricks), Vim, Emacs, MSOffice Suite.

Softwares, Packages & Visualization tools:
- FEA: COMSOL Multiphysics, ANSYS, FEMAP.
- Parallel-Processing: OPENMPI, Python-Multithreading, MPI4Py.
- Visualization & Design: Salome, GMESH, MAYAVI, GNUPlot, CAD, SOLIDWORKS

Operating Systems:
- Debian GNU/Linux and Debian-based Linux distros, OS X, MSWindows.

REFERENCES AVAILABLE TO CONTACT

Dr. Michael I Friswell
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