Associate Professor
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Education

CORNELL UNIVERSITY, College of Engineering, Ithaca, NY
PHD - Theoretical and Applied Mechanics: January 2007
Minor: Mathematics, **Advisor:** Prof. James T. Jenkins
Thesis: Studies of Axisymmetric Lipid Bilayer Vesicles: Parameter Estimation, Micropipette Aspiration, and Phase Transition.

INDIAN INSTITUTE OF SCIENCE, Bangalore, India
M. SC (ENGG). - Mechanical Engineering: June 2002
Advisor: Prof. Anindya Chatterjee
Thesis: Dynamics and Bifurcations of Some Nonlinear Systems: Analytical and Numerical Studies.

JADAVPUR UNIVERSITY, Kolkata, India
B. E. - Mechanical Engineering: July 1999

Academic Distinctions

Graduate School Fellowship, Cornell University, 2002−2003.
Best Master's Thesis of the Year, Indian Institute of Science, 2004.
National Talent Search Scholarship, West Bengal, India, 1993-1999.

Work Experience

Dec. 2016 - Present ASSOCIATE PROFESSOR, Indian Institute of Technology, Kharagpur, India.

June 2014 - Present ASSOCIATE PROFESSOR, Indian Institute of Technology, Kanpur, India.

Jan. 2015 - July, 2015 ASSOCIATE PROFESSOR (visiting), Indian Institute of Technology, Delhi, India.

Nov. 2009 - June 2014 ASSISTANT PROFESSOR, Indian Institute of Technology, Kanpur, India.

Oct. 2008 - Oct. 2009 SENIOR RESEARCH ENGINEER, Goodyear Tire & Rubber Company.
Worked on tire manufacturing and performance modeling to improve tire uniformity. Released one research report and submitted an invention disclosure.

Jan. 2007 - Sep. 2008 POSTDOCTORAL SCHOLAR, Department of Mathematics, Penn State University.
Worked on the adhesion of lipid bilayer vesicles (under the supervision of Prof. Qiang Du).

Oct. - Dec. 2005 VISITING SCHOLAR, Department of Chemistry, University of Pennsylvania.
Conducted experimental studies on lipid bilayer vesicles. (under the supervision of Prof. Tobias Baumgart).

Aug. 1999 - Jul. 2000 GRADUATE TRAINEE ENGINEER, Larsen & Toubro Limited, India.
Involved in designing equipments for a project for building a Milk Processing Plant.

Teaching Experience

UG Courses: Mechanics, Dynamics, Design of Machine Elements, Theory of Mechanisms and Machines, Biomechanics, Calculus, Matrices. (Recipient of top five feedback in first year courses at IIT Kharagpur)

PG Courses: Introduction to Continuum Mechanics, Introduction to Solid Mechanics, Theory of Elasticity, Theory of Plasticity, Approximate Methods in Engineering Mathematics, Principles of Dynamics, Mechanics of Biological Membranes.

Tutorial: Dynamics, Mechanics of Solids, Engineering Mechanics, Design of Machine Elements, Mechanisms, Calculus, Ordinary and Partial Differential Equations.

Sponsored Research

Motion and Interactions of Domains in Fluid Lipid Membranes, SERB, DST, 2012-2015, INR 25.66 lakhs.

Membrane curvature sensing and generation by proteins in lipid bilayer membrane, DBT, 2015-2018, INR 67.35 lakhs.
Other members: Prof. P. B. Sunil Kumar, IIT Madras (Co-PI), Dr. S. Matheswaran (Co-PI).

Contact mechanics of soft and thin adhesive structures, DST, INR 46.44 lakhs, 2018-2021.
Other member: Prof. Ishan Sharma(Co-PI).

Professional Activities

Served as external examiner of several Ph. D. theses.

Co-opted member of the UG curriculum committee of Indrasheel University.

Organizing Committee Member, *TEQIP School on Mechanics and Applied Mathematics for Engineers*, February 19-25, 2015, IIT Kanpur.

Organizing Committee Member, *Pravartana: Workshop on Mechanics and Applied Mathematics*, for four successive years 2013-2016, IIT Kanpur.

Organizer and International Coordinators Board Member of KITPC 2012 Program, *Membrane Biophysics: Theory and Experiment*, May 7-June 1, 2012, Beijing, China.

Organizer of a symposium in SIAM conference on Life Science (LS10), *Mechanics and Biophysics of Lipid Bilayer Membranes*, July 12, 2010, Pittsburgh, USA.

Served as a reviewer for *Nature Communications*, *Nature Physics*, *Biophysical Journal*, *Journal of Chemical Physics*, *Langmuir*, *Applied Physics Letters*, *Physical Review Letters*, *Physical Review E*, *PLoS ONE*, *Biological Chemistry*, *Philosophical Magazine & Philosophical Magazine Letters*, *Proceedings of the Royal Society of London A*, *Nonlinear Dynamics*.

Convener of Departmental Undergraduate Committee, Departmental Cordinater for the Computer Center, Member of BTech Project Evaluation Committee, Member of Departmental Postgraduate Committee, Mechanical Engineering, IIT Kanpur, 2010-2012.

Member of Vision 2020 Team, IIT Kanpur, 2010.

Organizer of the Inhouse Symposium, Mechanical Engineering Dept, IISc Bangalore, 2002.

Publications

Mahata, P. and Das, S. L.: **Generation of Wavy Structure on Lipid Membrane by Peripheral Proteins: A Linear Elastic Analysis**. *FEBS Letters*, **591**, 1333, 2017

Kumar, A., Das, S. L., and Wahi, P.: **Effect of radial loads on the natural frequencies of thin-walled circular cylindrical shells,**. *International Journal of Mechanical Sciences*, **122**, 37, 2017

Laxminarsimha Rao V., Roy S., and Das, S. L.: **Diffusion mediated coagulation and fragmentation based study of domain formation in lipid bilayer membrane**. *Physica B*, **505**, 74, 2017

Mohanty, D. P., Laxminarsimha Rao V., Das, S. L., and Ghatak, A.: **Polygonal deformation of a metallic foil subjected to impact by an axisymmetric indenter**. *Journal of Adhesion Science and Technology*, **31**, 1647, 2017

Rizvi, Md., S., Pal A., and Das, S. L.: **Structure-induced nonlinear viscoelasticity of non-woven fibrous matrices**. *Biomechanics and Modeling in Mechanobiology*, **15**, 1641, 2016

Kumar, A., Das, S. L., and Wahi, P.: **Instabilities of thin circular cylindrical shells under radial loading**. *International Journal of Mechanical Sciences*, **104**, 174, 2015

Laxminarsimha Rao V. and Das, S. L.: **Drag force on a liquid domain moving inside a membrane sheet surrounded by aqueous medium**. *Journal of Fluid Mechanics,* **779**, 468, 2015

Božič, B., Das, S. L., and Svetina, S: **Sorting of integral membrane proteins by curvature-dependent protein- lipid bilayer interaction**. *Soft Matter*, **11**, 2479, 2015

Mahata, P. and Das, S. L.: **Two-dimensional convex-molecule fluid model for surface adsorption of proteins: Effect of soft interaction on adsorption equilibria**. *Physical Review E*, **90**, 062713, 2014

Das, S. L., Mandal, T., and Gupta, S. S.: **Inextensional vibration of zig-zag single walled carbon nanotubes using nonlocal elasticity theories**. *International Journal of Solids and Structures* **50**, 2792, 2013

Rizvi, Md., S. and Das, S. L.: **Role of membrane addition in animal cell cytokinesis**. *Journal of Theoretical Biology* **315**, 139, 2012

Singh, P., Mahata, P., Baumgart, T., and Das, S. L.: **Curvature sorting of proteins on a cylindrical lipid membrane tether connected to a lipid reservoir**. *Physical Review E* **85**, 051906, 2012

Zhu, C., Das, S. L., and Baumgart, T.: **Nonlinear sorting, curvature generation, and crowding of Endophilin N-BAR on tubular membranes**. *Biophysical Journal* **102**, 1837, 2012

Baumgart, T., Capraro, B. C., Zhu, C., and Das, S. L.: **Thermodynamics and mechanics of membrane curvature generation and sensing by proteins and lipids**. *Annual Reviews in Physical Chemistry* **22**, 483, 2011

Das, S.: **Influence of the bending rigidity and the line tension on the mechanical stability of micropipette aspirated vesicles**. *Physical Review E* **82**, 021908, 2010 (Also appearing in the August 15, 2010 issue of Virtual Journal of Biological Physics Research)

Zhao, Y., Das, S., and Du, Q.: **Adhesion of multi-component vesicle membranes**. *Physical Review E* **81**, 041919, 2010 (Also appearing in the May 1, 2010 issue of Virtual Journal of Biological Physics Research)

Zhang, J., Das, S. L., and Du, Q.: **A phase field model of vesicle substrate adhesion**. *Journal of Computational Physics* **228**, 7837, 2009

Das, S. L., Jenkins, J. T., and Baumgart, T.: **Neck geometry and shape transitions in vesicles with co-existing fluid phases: Role of Gaussian curvature stiffness versus spontaneous curvature**. *Europhysics Letters,* **86**, 48003, 2009

Das, S. L., Tian, A., and Baumgart, T.: **Mechanical stability of micropipette aspirated giant vesicles with fluid phase coexistence**, *Journal of Physical Chemistry B,* **112**, 11625–11630, 2008

Das, S. L. and Du, Q.: **Adhesion of vesicles to curved substrates**, *Physical Review E,* **77**, 011907, 2008 (Also appearing in the January 15, 2008 issue of Virtual Journal of Biological Physics Research)

Das, S. L., and Jenkins, J. T.: **A higher-order boundary layer analysis for lipid vesicles with two fluid domains**, *Journal of Fluid Mechanics,* **597**, 429–448, 2008

Baumgart, T., Das, S. L., Webb, W. W., and Jenkins, J. T.: **Membrane elasticity in giant vesicles with fluid phase coexistence**, *Biophysical Journal,* **89**, 1067–1080, 2005

Das, S. L. and Chatterjee, A.: **Second order multiple scales for oscillators with large delay**, *Nonlinear Dynamics,* **39**, 375–394, 2005

Das, S. L. and Chatterjee, A.: **Multiple scales via Galerkin projections: approximate asymptotics for strongly nonlinear oscillators**, *Nonlinear Dynamics,* **32**, 161–186, 2003

Das, S. L. and Chatterjee, A.: **Multiple scales without center manifold reductions for delay differential equations near Hopf bifurcations**, *Nonlinear Dynamics,* **30**, 323–335, 2002

Das, S. L. and Chatterjee, A.: **An alternative stability analysis technique for the simplest walking machine**, *Nonlinear Dynamics,* **28**, 273–284, 2002

Conference proceedings

Kumar, A., Das, S.L., Wahi, P.: **Effect of radial loading on the beam mode vibration of circular cylindrical shells**, *Indian Conference on Applied Mechanics,* 2015, New Delhi, India.

Kumar, A., Das, S. and Wahi, P.: **Effect of radial loads and boundary conditions on the natural frequencies of a thin walled circular cylindrical shell**, *20th International Conference on Sound and Vibration,* 2013, Bangkok, Thailand.

Kumar, A., Das, S. and Wahi, P.: **Dynamic buckling of thin-walled circular cylindrical shells subjected to fluctuating radial loads**, *SMiRT 21,* 2011, New Delhi, India.

Buskohl, P., Das, S. L., Jenkins, J. T.: **Micropipette aspiration of lipid vesicles: A 2D approach**, *IASS-IACM 6th International Conference on Shell and Spatial Structures,* 2008, Ithaca, USA.

Das, S. L., Zhang J., and Du Q.: **Adhesion of lipid vesicles on patterened substrates**, *Biophysical Journal, 94, 1183, Meeting Abstract, 52nd Annual Meeting,* 2008, Long Beach, USA.

Das, S. L. and Jenkins, J. T.: **An analysis of micropipette aspiration of one-phase and two-phase vesicles**, *Biophysical Journal, 584A-584A, Meeting Abstract, 51st Annual Meeting,* 2007, Baltimore, USA.

Das, S. L. and Jenkins, J. T.: **Collisional flows of identical, smooth, nearly elastic spheres in a vertical chute**, *Powders and Grains,* 2005, Stuttgart, Germany.

Das, S. L. and Chatterjee, A.: **Stability analysis of the simplest walking machine**, *National Conference on Mechanisms and Machines,* 2001, Kharagpur, India.

Seminars

2018 Feb. San Francisco, California 62nd Annual Biophysical Society Meeting.
Poster presentation: Interplay of membrane curvature sensing and generation mediated by peripheral membrane proteins. (Presented by T. V. Sachin Krishnan)

2017 Sep IIT Palakkad, India
Seminar: Two Problems Interfacing Mechanics and Biology: Fibrous Composites and Domain Diffusion

2017 Jan IISc Bangalore, India Biosystems Science and Engineering Symposium
Invited Talk: Mechanics of Non-woven Fibrous Matrices and Their Interactions With Cells

2016 Sep JNCASR Bangalore, India
Invited Talk: Mechanics of Non-woven Fibrous Matrices and Their Interactions With Cells

2016 Sep Chemical Engineering, IISc Bangalore, India
Department Seminar: Biological Membrane Structure and Function A Mechanics Perspective

2016 Jan Pune, India CompFlu 2016
Invited Talk: Drag Force on a Liquid Domain Moving in a Two Dimensional Liquid Sheet

2014 Oct. Jülich, Germany Proteins & Nanoparticles Membranes 2014 - SoftComp Topical Workshop
Copresenter: Curvature sorting of integral membrane proteins by curvature-dependent protein- lipid bilayer interaction (Presented by Svetina S.)

2014 Jan. Pondicherry, India Soft Matter - Young Investigators Meet
Short Talk: Curvature Sorting of Proteins in a Cylindrical Membrane

2012 May KITPC, Beijing, China Program on Membrane Biophysics: Theory and Experiment
Short Talk: Role of Membrane Addition in Animal Cell Cytokinesis

2012 May KITPC, Beijing, China Program on Membrane Biophysics: Theory and Experiment
Short Talk: Curvature Sorting of Proteins in a Cylindrical Membrane

2010 Mar. NEHU Shillong, India NPMASS-ISSS Workshop on Microsystems Technology
Invited speaker: Structure and Mechanics of Biological Membranes

2008 Sep. IIT Chennai, India
Special Seminar: Lipid Bilayer Vesicles: Parameter Estimation, Micropipette Aspiration, and Adhesion.

2008 Sep. IISc Bangalore, India
Invited Seminar: Lipid Bilayer Vesicles: Parameter Estimation, Micropipette Aspiration, and Adhesion.

2008 Aug. IIT Kanpur, India
Invited Seminar: Lipid Bilayer Vesicles: Parameter Estimation, Micropipette Aspiration, and Adhesion.

2008 Aug. Jadavpur University, India
Special Seminar: Lipid Bilayer Vesicles: Parameter Estimation, Micropipette Aspiration, and Adhesion.

2008 June University Park, PA Workshop on Multi-Scale Modeling of Immune Responses.
Invited talk: Adhesion of vesicles to curved substrates: Implications to virus entry and nano-particle uptake.

2008 May UT Arlington, TX 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications.
Invited talk: A boundary layer analysis for two-phase lipid bilayer vesicle and vesicle adhesion.

2008 Feb. Goodyear Tire & Rubber Company, Akron, OH
Invited talk: Lipid Bilayer Vesicles: Parameter Estimation, Micropipette Aspiration, and Adhesion.

2008 Feb. Long Beach, California 52nd Annual Biophysical Society Meeting.
Poster presentation: Adhesion of lipid vesicles on patterned substrates.

2007 Jul.-Aug. UIUC, Urbana, IL CCM Summer Course on Cell Mechano-sensitivity.

2007 June Waterville, Maine Gordon Research Conference on Nonlinear Dynamics.
Poster presentation: Micropipette aspiration of giant vesicles with fluid phase coexistence.

2007 Mar. Baltimore, Maryland 51st Annual Biophysical Society Meeting.
Poster presentation: An analysis of micropipette aspiration of one-phase and two-phase vesicles.

2006 Dec. Bethesda, Maryland NICHD, NIH.
Invited seminar talk: Mechanics of lipid bilayer vesicles.

2006 July Raleigh, North Carolina SIAM Conference on the Life Sciences.
Minisymposium talk: Boundary layer analysis of the shape of two-phase lipid bilayer vesicles.

2005 July Stuttgart, Germany Powders and Grains.
Poster presentation: Collisional flows through a vertical chute.

2005 Jan. Paris, France Trimester on Granular materials.

2004 June Waterville, Maine Gordon Research Conference on Granular & Granular-Fluid Flow.
Poster presentation: Collisional flows through a vertical chute.

2003 Oct. Bristol, UK Geophysical Granular & Particle-Laden Flows.
Poster presentation: Collisional flows through a vertical chute.

2001 Dec. IIT Kharagpur, India National Conference on Mechanisms and Machines.
Contributed talk: Stability analysis of the simplest walking machine.