

June 14, 2021

Curriculum Vitae of Vishal Vasan

Reader F
International Centre for Theoretical Sciences
Tata Institute of Fundamental Research
Bengaluru, India 560089

Date of Birth: December 19, 1983
Citizenship: India

Phone: +91 80 4653 6350
Email: vishal.vasan@icts.res.in
Webpage: <https://www.icts.res.in/people/vishal-vasan>

Education

- Ph.D. Applied Mathematics, University of Washington, June 2012.
- M.S. Applied Mathematics, University of Washington, March 2009.
- M.S. Mechanical Engineering, Arizona State University, May 2007.
- B.E. Mechanical Engineering, Anna University, India, April 2005.

Fields of Interest

Analytical and numerical methods for partial differential equations and their applications. Inverse problems, boundary-value problems and stability theory.

Recognition

- R1 G. Haller (2019). *Solving the inertial particle equation with memory*. Journal of Fluid Mechanics: Focus on Fluids, **874**, 1–4.

Refereed Publications

- 22. V. Vasan, Manisha and D. Auroux. *Ocean-depth measurement using shallow-water wave models* (2021) Accepted in *Studies in Applied Mathematics*.
- 21. S. Krishnan, S. Bharadwaj and V. Vasan. *Impact of freely falling liquid containers and subsequent jetting* (2021) Submitted to *Experiments in Fluids*.
- 20. R. Nimiwal, U. Satpathi, V. Vasan and M. Kulkarni. *Soliton-like behaviour in non-integrable systems* arXiv:2101.01651 (2021).
- 19. A. Sharma, A. Mitra, R. Govindarajan and V. Vasan. *Spatio-temporal relationships between rain-fall and convective clouds during Indian monsoon through a discrete lens*. International Journal of Climatology (2020) **41** 1351–1368.

18. S. Swarup, V. Vasan and M. Kulkarni. *Provable bounds for the Korteweg-de Vries reduction in multi-component Nonlinear Schrödinger Equation*. Journal of Physics A: Mathematical and Theoretical (2020) **53** 135206.
17. D. Smith, T. Trogdon and V. Vasan. *Linear dispersive shocks* arXiv:1908.08716 (2019).
16. S. Ganga Prasath, V. Vasan and R. Govindarajan. *Accurate solution method for the Maxey-Riley equation, and the effects of Basset history*. Journal of Fluid Mechanics (2019) **868** 428–460.
15. A. Mitra, A. Apte, R. Govindarajan, V. Vasan, S. Vadlamani. *Spatio-temporal patterns of the Indian Monsoon rainfall*. Accepted in Dynamics and Statistics of the Climate System (2018) **3**.
14. A. Mitra, A. Apte, R. Govindarajan, V. Vasan, S. Vadlamani. *A discrete view of the Indian Monsoon to identify spatial patterns of rainfall*. Accepted in Dynamics and Statistics of the Climate System (2018) **3**.
13. B. Deconinck, Q. Guo, E. Shlizerman and V. Vasan. *Fokas's Unified Transform Method for linear systems*. Quarterly of Applied Mathematics (2018) **76** 463–488.
12. V. Vasan, K. L. Oliveras, D. Henderson and B. Deconinck. *A method to recover water-wave profiles from pressure measurements*. Wave Motion (2017) **75** 25–35.
11. V. Vasan and K. L. Oliveras. *Water-wave profiles from pressure measurements: Extensions*. Applied Mathematics Letters (2017) **68** 175–180.
10. J. Wilkening and V. Vasan. *Comparison of five popular methods of computing the Dirichlet–Neumann operator for the water-wave problem*. Contemporary Mathematics (2015) **635** 175–210.
9. K. L. Oliveras and V. Vasan. *Relationships between the pressure and the free surface independent of the wave speed*. Contemporary Mathematics (2015) bf 635 157–173.
8. B. Deconinck, T. Trogdon and V. Vasan. *The method of Fokas for solving linear partial differential equations*. SIAM Review (2014) **56** 159–186.
7. V. Vasan and K. L. Oliveras. *Pressure beneath a traveling wave with constant vorticity*. Disc. & Cont. Dyn. Sys. Ser. A (2014) **34** 3219–3239.
6. V. Vasan and B. Deconinck. *The Bernoulli boundary condition for traveling water waves*. Appl. Math. Letters (2013) **26** 515–519.
5. K. L. Oliveras and V. Vasan. *A new equation describing traveling water-waves*. J. Fluid Mech. (2013) **717**, 514–522.
4. V. Vasan and B. Deconinck. *The inverse water wave problem of bathymetry detection*. J. Fluid Mech. (2013) **714**, 562–590.
3. V. Vasan and B. Deconinck. *Well-posedness of boundary-value problems for the linear Benjamin-Bona-Mahony equation*. Disc. & Cont. Dyn. Sys. Ser. A (2013) **33**, 3171–3188.
2. B. Deconinck, K. L. Oliveras and V. Vasan. *Relating the bottom pressure and surface elevation in the water wave problem*. J. Non. Math. Phys. (2012) **19**, Suppl. 1 1240014.
1. K. L. Oliveras, V. Vasan, B. Deconinck and D. Henderson. *Recovering the water-wave surface from pressure measurements*. SIAM J. Appl. Math. (2012) **72**, 897–918.

Peer reviewed conference proceedings

4. A. Mitra, A. Apte, R. Govindarajan, V. Vasani, S. Vadlamani (2017). *Finding active and break spells in the Indian Monsoon by Markov Random Fields*. 7th International Workshop on Climate Informatics, National Center for Atmospheric Research, Boulder Colorado USA
3. A. Mitra, A. Apte, R. Govindarajan, V. Vasani, S. Vadlamani (2017). *Tracking the propagation of planetary scale cloud zones over Indian Ocean and South Asia with Markov Random Fields*. 7th International Workshop on Climate Informatics, National Center for Atmospheric Research, Boulder Colorado USA
2. B. Deconinck, D. Henderson, K. L. Oliveras and V. Vasani (2011). *Recovering the water-wave surface from pressure measurements*. Proceedings of 10th International Conference on Mathematical and Numerical Aspects of Waves - WAVES 2011. 4 pages
1. J. Riley and V. Vasani (2009). *Spectral energy transfer in strongly stratified flows*. Proceedings of EUROMECH Colloquium 512: Small Scale Turbulence and Related Gradient Structures, 94 – 96.

Academic Experience

Pennsylvania State University, Department of Mathematics

Position: S. Chowla Research Assistant Professor
Fall 2012–Spring 2015.

University of Washington, Department of Applied Mathematics

Position: Research Assistant
Advisor: B. Deconinck, Department of Applied Mathematics
Autumn 2010. Summer 2011.

Position: Research Assistant
Advisor: J. Riley, Department of Mechanical Engineering
Spring 2008–Autumn 2009.

Arizona State University, Department of Mechanical and Aerospace Engineering

Position: Research Assistant
Advisor: D. L. Boyer, Environmental Fluids Laboratory
Spring 2005–Spring 2007.

Teaching Experience

Faculty, ICTS-TIFR/CAM-TIFR

Experimental Lab course	2015,2016,2018,2019,2021
Introduction to Mechanics	Jan-Apr 2019
Introduction to Partial Differential Equations	Aug-Nov 2017

Instructor, Penn State University

MATH 251	Ordinary and Partial Differential Equations	Spring 2014
MATH 251	Ordinary and Partial Differential Equations	Fall 2013
MATH 250	Ordinary Differential Equations	Fall 2012

Instructor, University of Washington

AMATH 351 Ordinary Differential Equations Autumn 2011

Teaching Assistant, University of Washington

MATH 498B	Undergraduate Mathematical Sciences Seminar Coordinator	Spring 2012
MATH 498B	Undergraduate Mathematical Sciences Seminar Coordinator	Winter 2012
AMATH 403/503	Methods for Partial Differential Equations	Spring 2011
AMATH 507	Calculus of Variations	Winter 2011
AMATH 403/503	Methods for Partial Differential Equations	Spring 2010
MATH 126	Calculus with Analytic Geometry III	Spring 2010
MATH 126	Calculus with Analytic Geometry III	Autumn 2009
AMATH 352	Applied Linear Algebra and Numerical Analysis	Summer 2009
MATH 126	Calculus with Analytic Geometry III	Spring 2009
MATH 124	Calculus with Analytic Geometry I	Winter 2009
MATH 120	Precalculus	Winter 2008
MATH 124	Calculus with Analytic Geometry I	Autumn 2007

Invited workshops*Semester Program on "Singularities and Waves In Incompressible Fluids"*

ICERM, Providence, Rhode Island

January 30 - May 5, 2017

Organized by Bernard Deconinck, Yan Guo, Diane Henderson, Helena Nussenzweig Lopes, Govind Menon, Paul Milewski, Walter Strauss and Jon Wilkening

Nonhomogeneous boundary-value problems for nonlinear waves

American Institute of Mathematics, Palo Alto, California

May 13 to May 17, 2013

Organized by Jerry Bona, Min Chen, Shuming Sun, and Bingyu Zhang

Conference presentations and invited talks*Two unexpected boundary value problems*

Department of Mathematics, IIT Bombay

23rd October 2019 Mumbai

Markov random field model for the Indian monsoon rainfall

Department of Applied Physics and Applied Mathematics, Columbia University

27 June 2019 New York, NY

Fractional differential equations and boundary value problems

Applied Mathematics: The next 50 years

20th June 2019 University of Washington, Seattle

PDEs at ICTS

Indo-French scientific workshop, Université Côte d'Azur

7th February 2019

Nice

Applications of differential equations: what can you do with PDEs?

ICTS Colloquium

22nd January 2019
ICTS Bengaluru

Fractional derivatives, boundary value problems and heavy particles in a viscous fluid
ICTS Program on Integrable systems in Mathematics, Condensed Matter and Statistical Physics
16th July - 10th August 2018
ICTS Bengaluru

Analysis of an instability in stratified shear flow
The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications
July 6 2018
Taipei, Taiwan

Nonlinear waves and coherent structures
Seminar at TIFR Centre for Applicable Mathematics
April 12 2018
Bengaluru

Inverse problems in water waves
Seminar at SN Bose National Centre for Basic Sciences
February 7 2018
Kolkata

Analysis of shear instabilities in fluid mechanics
Climate Seminar Series of Interdisciplinary Program in Climate Studies at IIT Bombay
August 30 2017
Mumbai

The Unified Transform Method for nonlocal PDEs
Recent advances in nonlinear waves: Harvey Segur 75th birthday conference
July 31 2017 Seattle WA

Analysis of an instability in stratified fluid flow
Bouyancy driven fluid flows discussion meeting
June 19 2017 ICTS Bengaluru

Dynamics of free surfaces
Nehru Planetarium Summer Course research talk
May 27 2017 Bengaluru

A model for wind driven water waves
ICERM Water Waves conference
April 28 2017 Providence RI

Pressure boundary conditions in viscous incompressible flows
ICERM Singularities and Waves in Incompressible Fluids
April 19 2017 Providence RI

The bathymetry detection problem: a water wave approach
Department of Applied Physics and Applied Mathematics, Columbia University
March 28 2017 New York, NY

Computational methods for water-waves
ICERM Singularities and Waves in Incompressible Fluids
February 1 2017 Providence RI

Recovering water-wave profiles from pressure measurements

Department of Physics Bharatidasan University

January 18 2017 Trichy

The Uniform Transform Method for degenerate mixed PDEs and interface problems

SIAM Conference on Nonlinear Waves and Coherent Structures

August 8-11 2016 Philadelphia, PA

Gradient descent with nonlinear constraints

Complex systems discussion meeting

July 22 2016 ICTS Bangalore

Some inverse problems in water-waves

Research Seminar in Department of Computational and Data Sciences, Indian Institute of Science

April 22 2016 Bengaluru, Karnataka

A model for wind-driven surface gravity waves

Conference on Computational Mathematics and Nonlinear Dynamics, Visva-Bharati

February 19 2016 Santiniketan, West Bengal

Gradient descent with nonlinear constraints

Joint Mathematics Meet

January 9 2016 Seattle, WA

Growth rates for wind-driven surface gravity waves

Joint Mathematics Meet

January 8 2016 Seattle, WA

The bathymetry detection problem: a water-wave approach

Fluid Dynamics Research Consortium

October 2 2014 University Park, PA

Experiments in a fluids laboratory

Applied Mathematics Seminar, Seattle University

May 16 2014 Seattle, WA

Pressure beneath a traveling wave with constant vorticity

SIAM Analysis of Partial Differential Equations

December 8 2013 Orlando, FL

Measuring waves: two inverse problems in the lab

Mathematical methods seminar

Department of Applied Mathematics, University of Washington-Seattle

October 15 2013

Some inverse problems related to the theory of water waves

Invited talk part of Chacha Days Seminar

Department of Mathematics, University of North Carolina-Chapel Hill

August 23 2013 Chapel Hill, NC

The numerical simulation of time-dependent water waves in two and three dimensions

AMS Spring Western Section Meeting, University of Colorado

April 13-14 2013 Boulder, CO

The inverse water wave problem of bathymetry detection

The Eighth IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory

March 25-28 2013 Athens, GA

Traveling water waves in three dimensions

SIAM Conference on Nonlinear Waves and Coherent Structures

June 13-16 2012 Seattle, WA

The Inverse Problem: Reconstructing the bottom topography from surface measurements

SIAM Analysis of Partial Differential Equations

November 14-17 2011 San Diego, CA

Well-posedness of boundary-value problems for Linear BBM

AMS Fall Western Section Meeting, University of Utah

October 22-23 2011 Salt Lake City, UT

Boundary-value problems for linear PDEs with mixed derivatives

7th International Congress on Industrial and Applied Mathematics - ICIAM 2011

July 18-22 2011 Vancouver, BC

Boundary-value problems for the Linear Benjamin-Bona-Mahony Equation

The Seventh IMACS International Conference on Nonlinear Evolution Equations and Wave Phenomena: Computation and Theory

April 4-7 2011 Athens, GA

Green Meets Jordan: How to Solve PDEs using Complex Analysis

The Pritchard Lab seminar at the Department of Mathematics, Pennsylvania State University

September 13 2010 University Park, State College, PA

Direct numerical simulations of stratified turbulence at higher Reynolds numbers

Annual Meeting of the American Physical Society—Division of Fluid Dynamics

November 23 2008 San Antonio, TX

On spin-up and spin-down in axisymmetric containers

Fifth International Symposium on Environmental Hydraulics

December 4-7 2007 Phoenix, AZ

Poster presentation

Recovering Surface Elevation from Pressure Measurements: Theoretical Analysis

Young Researcher Poster Session at the 10th International Conference on Mathematical and Numerical Aspects of Waves - WAVES 2011, Simon Fraser University, Vancouver, BC

Winner of Young Researcher Best Poster Award

Mentoring and Advising

Joint-advisor of doctoral candidate Divya Jaganathan (ICTS)

Advisor of doctoral candidate Manisha Goyal (ICTS)

Postdoctoral advisor to Dr. Shibi Vasudevan (ICTS)

Postdoctoral advisor to Dr. Sangeeth Krishnan (ICTS)

Co-advisor of Patrick Sprenger (with Katie Oliveras of Seattle University).

Co-advisor of Edward Charlesworth (with Katie Oliveras of Seattle University).

Honors and Awards

Boeing Award for Research Excellence in Applied Mathematics (2011)

Service

Professional societies

Associate of Indian Academy of Sciences 2020

Member of National Academy of Sciences, India 2018

Member SIAM 2009–Present.

Member SIAG in Nonlinear Waves and Coherent Structures 2012–Present.

Member, American Mathematics Society, 2007–Present.

Minisymposia/Workshops organized

Co-organizer of *ICTS Program on Integrable Systems in Mathematics, Condensed Matter Physics and Statistical Physics*, ICTS-TIFR Bengaluru, July 16-Aug 10 2018

Co-organizer of *ICTS Summer School and Discussion Meeting on Bouyancy-Driven Fluid Flows*, ICTS-TIFR Bengaluru, June 12-20 2017

Co-organizer of *Minisymposia on Water waves*, 8th IMACS Conference on Nonlinear Waves, Athens, GA, March 25-28 2013

Co-organizer of *Minisymposia on Water Wave Bifurcations: Theory and Numerics*, SIAM Nonlinear Waves and Coherent Structures, Seattle, WA, June 13-16 2012

Co-organizer of *Minisymposia on Analysis and Numerics of Euler Water Wave Equations*, SIAM Analysis of PDEs, San Diego, CA, Nov 14-17 2011

Referee for

Studies in Applied Mathematics, Journal of Fluid Mechanics, Environmental Fluid Mechanics, European Journal of Fluid Mechanics B/Fluids, Journal of Computational Physics, Discrete and Continuous Dynamical Systems - Series A, MDPI Remote Sensing, Pramana

Last updated: June 14, 2021

<https://www.icts.res.in/sites/default/files/cv.pdf>