

ACADEMIC APPOINTMENT	Assistant Professor, Department of Mathematics, Indian Institute of Technology Madras, Chennai - 600 036	August 2017 – Present
PREVIOUS APPOINTMENTS	Indian Institute of Science Assistant Professor, Department of Computational & Data Sciences	April 2016 – August 2017
	ICTS, Tata Institute of Fundamental Research Faculty, Interdisciplinary and Applied Mathematics	Jul 2015 – Mar 2016
	Courant Institute of Mathematical Sciences, New York University Assistant Professor, Department of Mathematics	Aug 2013 – May 2015
EDUCATION	Stanford University <ul style="list-style-type: none">• Doctor of Philosophy, Institute for Computational and Mathematical Engineering <i>Thesis Title: Fast Algorithms for Dense Numerical Linear Algebra and Applications.</i> <i>Advisor: Prof. Eric Darve.</i>• Master of Science, Statistics• Master of Science, Institute for Computational and Mathematical Engineering Indian Institute of Technology Madras <ul style="list-style-type: none">• Master of Technology, Aerospace Engineering• Bachelor of Technology, Aerospace Engineering	Sep 2007 – Jun 2013 Jul 2002 – Jun 2007
RESEARCH	Numerical Analysis, Numerical linear algebra, Fast algorithms, Approximation theory with applications to Inverse problems, Scattering, Computational statistics, Material Homogenization, Data assimilation, Filtering.	
HONORS & AWARDS	<ul style="list-style-type: none">• “Young Faculty Recognition Award” by Indian Institute of Technology, Madras, 2019.• “Young Scientist Research Award” by the Department of Atomic Energy, India, 2017.• Simons Foundation fellowship under “Science without Boundaries” of ICTS-TIFR, 2015.• “INSPIRE Faculty Award” to young achievers for independent research and emerge as a leader in future science & technology by the Department of Science & Technology, India, 2015.• Research Internship in Science and Engineering by Indo-US Science & Technology Forum at Tata Institute of Fundamental Research, Centre for Applicable Mathematics, Bangalore, 2011.• Stanford Interdisciplinary Graduate Fellowship - Honorable mention, 2010.• Centennial Teaching Assistant Award by Stanford in honor of outstanding teaching, 2009.• Stanford University departmental fellowship to pursue graduate studies, 2007.• Cornell University departmental fellowship to pursue graduate studies, 2007 (declined).• Dr. V. Mohan Raman Prize, for best academic record in Bachelors and Masters in Aerospace Engineering, Indian Institute of Technology Madras, India, 2007.• Institute Medal for highest GPA in Aerospace Engineering for three consecutive years, Indian Institute of Technology Madras, India, 2004 – 07.• 99.81 percentile (out of 200,000 students) in the Common Aptitude Test, an all-India test conducted by the Indian Institute of Management, India, 2007.• General Electric Scholar-Leader scholarship for academic achievements and leadership qualities, 2006.• One among 30 students from all over India, to get selected for the International Mathematical Olympiad Training Camp held at Homi Bhabha Center for Science and Education, Mumbai, India, 2002.	

- First in Mathematics Olympiad held by Association of Mathematics Teachers of India, 2001 & 2002.
- Fellowship by Nanyang Technological University, to pursue undergraduate education in Engineering, 2002 (declined).
- One among 750 students from a pool of about 350,000 students to be awarded National Talent Search Examination Scholarship by the Central Government of India, 2000.

TEACHING EXPERIENCE

Indian Institute of Technology Madras

- Numerical Linear Algebra. **July – November 2019**
- Numerical Methods & Scientific Computing. **July – November 2019**
- Computer Modelling and Simulation. **January – April 2019**
- Probability, Statistics and Stochastic Processes. **January – April 2019**
- Numerical Linear Algebra. **July – November 2018**
- Computer Modelling and Simulation. **January – April 2018**
- Probability, Statistics and Stochastic Processes. **January – April 2018**

Indian Institute of Science, Bengaluru

- Constructive approximation theory for computational scientists. **January – April 2017**
- Short term course on Numerical Methods for Engineers & Scientists. **December 2016**
- Numerical Linear Algebra. **August – December 2016**

International Centre for Theoretical Sciences, Bengaluru

- Fast Matrix Computation, taught at IISc. **January – April 2016**

Courant Institute of Mathematical Sciences, NY

- Discrete Mathematics. **January – May 2015**
- Analysis. **September – December 2014**
- Mathematics for Economics. **January – May 2014**
- Algebra and Calculus. **September – December 2013**

Stanford University, CA

- Discrete Mathematics
Summer program by “Army High Performance Computing Research Center” **July 2013**
- Numerical Linear Algebra
Summer program by “Army High Performance Computing Research Center” **July 2012**
- Applied Analysis
Math refresher course for incoming engineering graduate students. **September 2011**
- Numerical Linear Algebra
Summer program by “Army High Performance Computing Research Center” **July 2011**
- Teaching Assistant, Institute for Computational and Mathematical Engineering
Undergrad courses in Vector Calculus, Linear Algebra and PDE’s, Probability and Statistics **2008 – 2009**

MENTORING

Indian Institute of Science

- Doctoral Student(s):
 - Kandappan (Computational & Data Sciences, IISc; August 2016 – Present)
 - Vaishnavi Gujjula (National Mathematics Initiative, IISc; August 2016 – Present)
 - Ritesh Khan (Mathematics, IITM; August 2019 – Present)
- Alumni:

- Shyam Sundar Sankaran (Project Associate @ IIT Madras; May 2018 – June 2019)
- Abhay Gupta (M.S. Student @ IISc; Aug 2016 – Dec 2018)
- Nachiketa Mishra (Airbus Postdoctoral Fellow @ TIFR-ICTS; Feb 2016 – Jan 2018)
- Karan Raj Singh (Project Associate @ IISc; Aug 2016 – May 2017)
- Richa Naik (Intern @ IISc; May 2017 - July 2017)
- Deeksha Koul (Intern @ IISc; Dec 2016 - Apr 2017)
- Ankit kumar (S.N.Bhatt Fellow @ ICTS-TIFR; May 2016 – July 2016)
- Chaitanya Tappu (S.N.Bhatt Fellow @ ICTS-TIFR; May 2016 – July 2016)

PUBLICATIONS

Google Scholar (as of November 22nd, 2019): Number of citations: 794, h-index: 14, i10-index: 16, Erdos number: 4

• Journal Publications:

14. “HODLRlib: A Library for Hierarchical Matrices”, The Journal of Open Source Software. Authors: [Ambikasaran, S.](#), Karan Raj Singh and Shyam Sundar Sankaran. Year: 2019
13. “Fast and scalable Gaussian process modeling with applications to astronomical time series”, The Astronomical Journal. Authors: D Foreman-Mackey, E Agol, [Ambikasaran, S.](#), R Angus. Year 2017
12. “An accurate, fast, mathematically robust, universal, non-iterative algorithm for computing multi-component diffusion velocities”, Proceedings of the Combustion Institute. Authors: [Ambikasaran, S.](#), Krithika N. Year 2016
11. “Fast, adaptive, high order accurate discretization of the Lippmann-Schwinger equation in two dimension”, SIAM Journal on Scientific Computing. Authors: [Ambikasaran, S.](#), Borges, C., Imbert-Gerard, L.M., and Greengard, L. Year: 2016
10. “A fast block low-rank dense solver with applications to finite-element matrices”, Journal of Computational Physics. Authors: AmirHossein Aminfar, [Ambikasaran, S.](#), and Darve, E.F. Year: 2016
9. “Generalized Rybicki Press Algorithm”, in Numerical Linear Algebra with applications. Author: [Ambikasaran, S.](#) Year: 2015
8. “Fast hierarchical algorithms for Gaussian processes”, in IEEE Transactions on Pattern Analysis and Machine Intelligence. Authors: [Ambikasaran, S.](#), Foreman-Mackey, D., Greengard, L., Hogg, G., and O’Neil, M. Year: 2015
7. “A fast direct solver for scattering from a large cavity in two dimensions”, in SIAM Journal on Scientific Computing. Authors: Lai, J., [Ambikasaran, S.](#), Greengard, L. Year: 2014
6. “A Kalman filter powered by \mathcal{H}^2 -matrices for quasi-continuous data assimilation problems”, in Water Resources Research. Authors: Li, J.Y., [Ambikasaran S.](#), Kitanidis, P.K., Darve, E. Year: 2014
5. “Large-scale stochastic linear inversion using hierarchical matrices”, in Computational Geosciences. Authors: [Ambikasaran, S.](#), Li, J.Y., Kitanidis, P.K., Darve, E.F. Year: 2013
4. “An $\mathcal{O}(N \log N)$ fast direct solver for partially hierarchical semi-separable matrices”, in Journal of Scientific Computing. Authors: [Ambikasaran, S.](#), and Darve, E.F. Year: 2013
3. “Deterministic matrices matching the compressed sensing phase transitions of Gaussian random matrices”, in Proceedings of the National Academy of Sciences. Authors: Monajemi, H., Jafarpour, Sina., Gavish Matan., Donoho, D. L., [Ambikasaran, S.](#), et. al. Year: 2013
2. “Application of hierarchical matrices in geostatistics”, in Oil & Gas Science and Technology - Revue d’IFP Energies Nouvelles. Authors: Saibaba, A.K., [Ambikasaran, S.](#), Li, J.Y., Kitanidis, P.K., Darve, E.F. Year: 2012
1. “Untruncated infinite series superposition method for accurate flexural analysis of isotropic or orthotropic rectangular plates with arbitrary edge conditions”, in Composite Structures. Authors: K. Bhaskar and [Ambikasaran, S.](#) Year: 2008

• Book chapter(s):

- “Fast algorithms for Bayesian inversion”, Computational challenges in the Geosciences, IMA Volumes in Mathematics and its Applications. Authors: [Ambikasaran, S.](#), Saibaba, A.K., Darve, E.F., Kitanidis, P.K. Year: 2013

- **Conference proceedings:**
 - “Efficient data assimilation tool in conjunction with TOUGH2 for CO₂ monitoring”, TOUGH symposium 2012, Li, J.Y., [Ambikasaran, S.](#), Kitanidis, P.K., Darve, E. Year: 2012
- **Mathematical packages:**
 - BBFMM2D - Black Box Fast Multipole Method in two dimensions.
Available at: <https://github.com/sivaramambikasaran/BBFMM2D>
 - FLIPACK - Fast Linear Inversion PACKage.
Available at: <https://github.com/sivaramambikasaran/FLIPACK>
 - HODLR - Fast Direct Solver Package.
Available at: <https://github.com/sivaramambikasaran/HODLR>
 - ESS - Extended SemiSeparable Solver.
Available at: <https://github.com/sivaramambikasaran/ESS>
 - Celerite - Scalable 1D Gaussian Processes in C++, Python, and Julia
Available at: <https://github.com/dfm/celerite>
 - George - Fast and flexible Gaussian Process regression in Python Available at: <https://github.com/dfm/george>

ORGANIZED MINI-SYMPOSIUMS

- “Fast Linear Algebra for UQ in Inverse Problems and Data Assimilation”, SIAM Conference on Uncertainty Quantification, April 1st, 2014.

CONFERENCES

- “An accurate, fast, mathematically robust, universal, non-iterative algorithm for computing multi- component diffusion velocities”, 36th International Conference on Combustion, August 5th, 2016 at COEX, Seoul, South Korea.
- “ $\mathcal{O}(N)$ sparse direct solver for finite difference matrices”, Computational Partial Differential Equations 2015, December 22nd, 2015 at TIFR Centre for Applicable Mathematics, Bengaluru.
- “Generalised Rybicki Press Algorithm”, SIAM Linear Algebra, October 29th, 2015 at Atlanta.
- “The inverse fast multipole method”, SIAM Annual meeting, July 9th, 2014 at Chicago.
- “Hierarchical Matrix Powered Fast Kalman Filtering and Uncertainty Quantification”, SIAM Conference on Uncertainty Quantification, April 1st, 2014 at Savannah.
- “Fast Linear Algebra for Stochastic Inversion in Large-Scale High-Dimensional Complex Systems”, SIAM Annual Meeting, July 11th, 2013 at San Diego.
- “Fast Direct Solvers for Hierarchical Matrices”, SIAM Annual Meeting, July 10th, 2013 at San Diego.
- “Large-scale Stochastic Linear Inversion using Hierarchical Matrices”, SIAM Conference on Computational Science & Engineering (CSE13), February 27th, 2013 at Boston.
- “Fast Kalman filtering, data assimilation and uncertainty quantification”, Thermal and Fluid Sciences Affiliates and sponsors program, TFSA, February 14th, 2013 at Stanford.
- “Fast Linear Algebra Applications in Stochastic Inversion and Data Assimilation”, Kitanidis P.K., Ambikasaran S., Saibaba A.K., Li J.Y., Darve E.F., AGU Fall meeting, December 6th, 2012 at San Francisco.
- “Efficient Data Assimilation Tool For Real Time Subsurface Monitoring”, AGU Fall meeting, December 6th, 2012 at San Francisco.
- “Fast & scalable algorithms in computational linear algebra”, SuperComputing-12, November 13th – 15th, 2012 at Salt Lake.
- “Fast algorithms in computational physics”, Young Researchers Meet. YRM-2012, May 26th – 27th, 2012 at Stanford.
- “Efficient data assimilation tool in conjunction with TOUGH2 for CO₂ monitoring”, Proceedings, TOUGH Symposium 2012, Lawrence Berkeley National Laboratory, Berkeley, California, September 17th – 19th, 2012 at LBNL.
- “Fast Linear Algebra”, SuperComputing-11, November 16th – 17th, 2011 at Seattle.

- “Fast Direct Solvers for a class of matrices”, 7th International Congress on Industrial and Applied Mathematics, ICIAM, July 19th, 2011 at Vancouver.
- “Fast linear algebra using low rank approximations”, Thermal and Fluid Sciences Affiliates and sponsors program, TFSA, February 3rd, 2011 at Stanford.

SEMINARS AND INVITED TALKS

- “The art of presenting science”, Department of Mathematics, Indian Institute of Technology Madras, Oct 24th, 2019.
- “Finite precision computations in computational physics and machine learning”, Department of Mathematics, Indian Institute of Technology Madras, August 3rd, August 1st, 2019.
- “Fast matrix algorithms in computational physics”, Department of Computational & Data Sciences, Indian Institute of Science, Jan 27th, 2016.
- “Fast linear algebra”, Airbus Day, International Centre for Theoretical Sciences, January 11th, 2016.
- “Fast algorithms for computational statistics and elliptic PDEs”, Super Computer Education & Research Centre, Indian Institute of Science, September 14th, 2015.
- “Fast algorithms for computational statistics and elliptic PDEs”, Centre for Applicable Mathematics, Tata Institute of Fundamental Research, September 8th, 2015.
- “Fast algorithms for computational statistics and elliptic PDEs”, Chennai Mathematical Institute, July 22nd, 2015.
- “Fast algorithms for computational statistics and elliptic PDEs”, Department of Mathematics, Indian Institute of Science, June 24th, 2015.
- “The inverse fast multipole method”, Fast Direct Methods for elliptic PDE’s Workshop at Dartmouth, June 28th, 2014.
- “Fast algorithms for elliptic PDE’s & Gaussian processes”, Department of Mathematics, Indian Institute of Technology Madras, February 17rd, 2015.
- “Fast algorithms for elliptic PDE’s & Gaussian processes”, International Centre for Theoretical Sciences, Tata Institute of Fundamental Research, February 3rd, 2015.
- “Fast solver for elliptic partial differential equations”, Mathematics Colloquium, Carnegie Mellon University, October 3rd, 2014.
- “Fast algorithms for data analysis”, Center for Nonlinear Analysis, Carnegie Mellon University, October 2nd, 2014.
- “Extended sparsification and hierarchical compression based fast direct solver”, Numerical analysis seminar, Courant, April 11th, 2014.
- “Fast algorithms for dense numerical linear algebra”, Courant Instructor day, September 27th, 2013.
- “Fast dense linear algebra”, Lawrence Berkeley National Laboratory, December 4th, 2012.
- “Fast multipole method and hierarchical matrices”, SUPRI-B seminar series, Stanford University, CA, October 23rd, 2012.
- “A fast data assimilation technique for real time CO₂ monitoring”, Global Climate and Energy Project (GCEP) Student Energy Lectures. Stanford, July 16th, 2012.
- “Fast Direct Solvers”, Applied Math Seminar. Stanford, December 7th, 2011.
- “ $\mathcal{O}(N)$ Fast Direct Solver for System of Algebraic Equations”, Predictive Science Academic Alliance Program. PSAAP, October 7th, 2011.
- “Fast algorithms in computational physics”, Centre for Mathematical Modeling and Computer Simulation, Bangalore, India, August 25th, 2011.
- “Fast algorithms in computational physics”, TIFR Centre for Applicable Mathematics, Bangalore, India, August 10th, 2011.
- “Fast Linear Algebra Using Low Rank Properties of Matrices”, Center for Turbulence Research. CTR, January 14th, 2011.

- “Fast direct solvers for integral equations”, Linear Algebra and Optimization Seminar, Stanford University, CA, May 20th, 2010.

POSTERS

- “Fast Direct methods for Gaussian Processes”, Data Science Moore-Sloan launch event, April 28th, 2014.
- “Real-time monitoring at CO₂ sequestration sites: Fast inversion, assimilation and risk evaluation”, GCEP symposium 2012, Stanford University, October 10th, 2012.
- “Fast linear multi-frontal solvers for finite volume matrices”, Predictive Science Academic Alliance Program. PSAAP, September 6th, 2012.
- “Fast data assimilation for real-time CO₂ monitoring using a TOUGH2 Model”, TOUGH Symposium 2012, Lawrence Berkeley National Laboratory, Berkeley, California, September 17th – 19th, 2012.
- “Fast $\mathcal{O}(N)$ linear solvers without preconditioners”, Army High Performance Computing Research Center. AH-PCRC, November 30th, 2011.
- “Fast $\mathcal{O}(N)$ linear solvers without preconditioners”, Predictive Science Academic Alliance Program. PSAAP, October 6th, 2011.
- “Using Domain Specific Languages to Build Fast Direct Solvers”, Predictive Science Academic Alliance Program. PSAAP, April 28th, 2011.
- “Direct Solvers for FEMs in Liszt”, Predictive Science Academic Alliance Program. PSAAP, October 18th, 2010.

INTERNSHIPS

- **TIFR Centre for Applicable Mathematics**, Bangalore, India **August 2011**
- **John F. Welch Technology Centre**, Bangalore, India **May 2006 – June 2006**
Designed non-invasive diagnostics to predict the heart rate variability, with Dr. P.J. Lavakare.
- **National Aerospace Laboratories**, Bangalore, India **May 2005 – June 2005**
Computational and Theoretical Fluid Dynamics Division
Aerofoil Optimization using Discrete Adjoint Method, with Manoj T Nair.

WORKSHOPS

- Waves and Imaging **July 2011**
Gene Golub SIAM Summer School July 4 – 15, 2011, University of British Columbia, Vancouver, Canada.
- Fast Direct Solvers for Elliptic PDEs **June 2014**
2014 CBMS-NSF Conference: Fast Direct Solvers for Elliptic PDEs June 23 – 29, 2014, Dartmouth College, USA.

OTHER ACTIVITIES

- Vice-President, Society for Industrial and Applied Mathematics, Stanford Chapter, 2010 – 2013.
- Member of Computational and Mathematical Consulting (C²), Stanford University, CA, 2010.
- Vice-President, Stanford Hindu Student Council, Stanford University, CA, 2008 – 2009.