Curriculum Vitae   **Vamsi Pritham Pingali**

Education

2004–2008	B.Tech	Engineering Physics	Indian Institute of Technology Bombay (IIT B)
2008–2009	MA	Mathematics	Stony Brook University
2009–2013	PhD	Mathematics	Stony Brook University

Employment History

- 2021-Present: Associate Professor, Department of Mathematics, Indian Institute of Science.

- 2016-2021 : Assistant Professor, Department of Mathematics, Indian Institute of Science.

- 2013-2016: J.J. Sylvester Assistant Professor of Mathematics, Johns Hopkins University.

- 2012 : Employed to write a solutions manual to the book "Complex Analysis : In the spirit of Lipman Bers by J. Gilman, I. Kra and R. Rodriguez."

Honours, Grants, and Awards

- Awarded the President's Silver medal for academic excellence in IIT B by Her Excellency, the President of India (2008).

- Received the Chairman's teaching award for outstanding teaching by a graduate student in Stony Brook (2013).

- Awarded the Early career research grant (ECR/2016/001356) by SERB.

- Junior Associate of the International Centre for Theoretical Physics (ICTP), Trieste, Italy (2018-2023).

- Awarded the Infosys Young Investigator Award by the Infosys foundation (2017-2019).

- Associate, Indian Academy of Sciences (2021-2024).

- Awarded the Indian National Science Academy Young Scientist Award (2021).

RESEARCH

Research Interests

Differential geometry and geometric analysis, several complex variables, mathematical physics, and applications.

Publications, Conference Proceedings, and Pre-prints

- On Bott-Chern forms and their applications (with Leon Takhtajan) -
  Mathematische Annalen, Vol 360, 519-546, 2014.

- On a generalised Monge-Ampére equation -
  Journal of Partial Differential Equations, Vol 27(4), 333-346, 2014.

- On the boundedness of effective potentials arising from string compactifications (with Michael Douglas and Marcelo Disconzi) -
  Communications in Mathematical physics, Vol 325(3), 847-878, 2014.

- On the Choquet-Bruhat–York-Friedrich formulation of the Einstein-Euler equations (with Marcelo Disconzi)-
  Modern Physics Letters A, Vol 29(39), 1-16, 2014.

- Remarks on positive energy vacua via effective potentials in string theory (with S.Dabholkar and M. Disconzi) -
  Letters in Mathematical physics, Vol 104(7), 893-910, 2014.

- A fully nonlinear Monge-Ampère PDE on a torus -
  Electronic Journal of Differential Equations, Vol 211, 1-8, 2014.

- Computing Teichmüller maps between polygons (with Mayank Goswami, David Gu, and Gaurish Telang)
  Presented at SoCG 2015 and published in Journal of Foundations of Computational Mathematics, Vol 17(2), 497-526, 2017.

- On the asymptotics of the on-diagonal Szego kernel of certain Reinhardt domains (with Arash Karami) -
  Complex variables and Elliptic equations, Vol 24, 1-15, 2015.

- Bargmann-Fock extension from singular hypersurfaces (with Dror Varolin) -
  Crelle's Journal, Vol 717, 227-249, 2016.

- Load balanced short path routing in large-scale wireless networks using area-preserving maps (with Mayank Goswami, Chien-Chun Ni, X. Ban, and David Gu) -
  Proceedings of the 15th ACM international symposium on Mobile ad hoc networking and computing, Nov 2014 (63-72).

- Weighted interpolation from certain singular affine hypersurfaces -
  International journal of mathematics, Vol 26(2), 1-9, 2015.

- Inverses of structured vector bundles (with Indranil Biswas) -
  Geometriae Dedicata, Vol 179, 279-285, 2015.

- $C^{2,\alpha}$ estimates and existence results for certain nonconcave PDE,
  The Electronic Journal of Differential Equations, Vol 168, 1-10, 2015.

- A priori estimates for a generalised Monge-Ampére PDE on some compact Kähler manifolds,
  Complex Variables and Elliptic Equations, Vol 24, 1-15, 2016.

- Rational cuspidal curves on Del-Pezzo surfaces (with Indranil Biswas, Ritwik Mukherjee, and Shane D'Mello),
  Journal of Singularities, Vol. 17, 91-107, 2018.

- A note on higher extremal metrics,
  Transactions of the American Mathematical Society, Vol. 370(10), 6995-7010, 2018.

- Representability of Chern-Weil forms,
  Mathematische Zeitschrift, Vol. 288 (1-2), 629-641, 2018.

- Existence of coupled Kähler-Einstein metrics using the continuity method,
  International Journal of Mathematics, Vol. 29 (5), 1850041, 2018.

- A characterization of finite vector bundles on Gauduchon astheno-Kähler manifolds (with Indranil Biswas),
  Épijournal de Géométrie Algébraique, Vol. 2, 1-13, 2018.

- A note on the deformed Hermitian Yang-Mills PDE,
  Complex Variables and Elliptic Equations, Vol. 64(3), 503-518, 2019.

- Non-uniformly flat affine algebraic hypersurfaces (with Dror Varolin),
  Nagoya Mathematical Journal, https://doi.org/10.1017/nmj.2019.2, 2019.
  Erratum with A. Mandal and D. Varolin, Nagoya Mathematical Journal, https://doi.org/10.1017/nmj
  2023.

- Quillen metrics and perturbed equations,
  Letters in Mathematical Physics, Vol. 110 : 1861-1875, 2020.

- Metric properties of parabolic ample bundles (with Indranil Biswas),
  International Mathematical Research Notices, Vol. 23, 9336-9369, 2020.

- A vector bundle version of the Monge-Ampere equation,
  Advances in Mathematics, Vol. 360, 106921, 2020.

- On coupled constant scalar curvature Kahler metrics (with Ved Datar),
  Journal of Symplectic Geometry, Vol. 18, Issue 4, 2020.

- Estimating a Genius - Louis Nirenberg,
  Resonance, 25(6), 751-756, 2020.

- Gravitating vortices and the Einstein–Bogomol'nyi equations (with Luis Alvarez-
  Cónsul, Mario Garcia-Fernandez, and Oscar Garcia-Prada),
  Mathematische Annalen, Vol. 379, No.3-4, 1651-1684, 2021.

- The deformed Hermitian Yang-Mills equation on three-folds,
  Analysis and PDE, Vol. 15, No. 4: 921-935, 2022.

- Gravitating vortices with positive curvature (with Mario Garcia-Fernandez and
  Chengjian Yao),
  Advances in Mathematics, Vol. 388, 107851, 2021.

- On an asymptotic characterisation of Griffiths semipositivity (with Apoorva
  Khare),
  Bulletin des Sciences Mathématiques Vol. 167, 102956, 2021.

- A numerical criterion for generalised Monge-Ampère equations on projective
  manifolds (with Ved V. Datar),
  Geometric and Functional Analysis Vol. 31, Issue 4, 767-814, 2021.

- A note on Demailly's approach towards a conjecture of Griffiths,
  Comptes Rendus Mathématique Vol. 359, Issue 4, 501-503, 2021.

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- Stability of SGD :Tightness analysis and improved bounds (with Yikai Zhang, Wenjia Zhang, Sammy Bald, Chao Chen, Mayank Goswami),
Proceedings of Uncertainty in Artificial Intelligence 180: 2364-2373, 2022.

- Physics helping mathematics: a couple of examples,
Mathematics Student Vol. 92, No 3-4: 1-6, 2022.

- Obstructions to the existence of solutions of the self-dual Einstein-Maxwell-Higgs equations on a compact surface (with Luis Alvarez-Consul, Mario Garcia-Fernandez, Oscar Garcia-Prada, and Chengjian Yao),
Bulletin des Sciences Mathematiques, Vol. 183, 103233, 2023.

- The Demailly system for a direct sum of ample line bundles on Riemann surfaces,
Calculus of variations and partial differential equations Vol. 62, Issue 6, 172, 2023.

- Criteria for the ampleness of certain vector bundles,
Proceedings of the American Mathematical Society, Vol. 152, No 5: 1961-1968, 2024.

- Non-abelian symmetric critical gravitating vortices on a sphere,
Mathematische Annalen, 391(4), 5211-5233, 2024.

- Gravitating vortices and symplectic reduction by stages (with L Álvarez-Cónsul, M Garcia-Fernandez, O Garcia-Prada, and C. Yao),
arXiv: 2406.03639 (Accepted for publication by Journal of European Mathematical Society).

- Positivity properties of the vector bundle Monge-Ampère equation (with Aashirwad N. Ballal),
arXiv: 2409.00321.

Mentoring

- Undergraduate senior theses: Vasanth Pidaparthi - 2020, Abishek Rajan -2021, Aritra Chatterjee - 2023, Kumar Satyadarshi - 2024, Atharva Suresh Ghughare - 2024.

- PhD students: Kartick Ghosh (graduated in 2023), Arindam Mandal (graduated in 2024), Aashirwad N. Ballal (PMRF, will graduate in 2025), Rajas Sompurkar (jointly advised with Ved Datar, graduated in 2024)

- Visiting students : Vishnu Nandkumaran (Master's project, IISER-Pune) - 2020, Arnab Roy (Summer project, Ramakrishna Mission Residential College, Indian Academy of Sciences Fellowship) - 2019, Louis Gradt (Master's project, Paris-Sud, Raman-Charpak fellowship) - 2017, Asfaq Hossain (Reading course, Indian Statistical Institute) - 2016, Dhivya Prakash (online summer project, CMI) - 2021, Arka Karmarkar (summer project, CMI, online) - 2020, Sayantan Chakraborty (summer project and Master's thesis, CMI, online) - 2020, Sayan Chattopadhyay (Master's thesis, IISER Mohali, online) - 2022.

Selected conference talks, colloquiua, and seminars

- "Some computational and analytic aspects of Chern-Weil forms" - Young Researchers Meet 2012, Stanford, 2012.

- "Computational and analytic properties of Chern-Weil forms" - Maryland-Johns Hopkins joint Complex Geometry Seminar, 2012.

- "Weighted L^2-extension of holomorphic functions from singular hypersurfaces" - PDE seminar, Vanderbilt University, 2014.

- "Computational and analytic aspects of Chern-Weil theory" - Colloquium, Indian Institute of Science, 2015.

- "Weighted L^2-extension of holomorphic functions from singular hypersurfaces" - Colloquium, Institute of Mathematical Sciences, 2015.

- "A generalised Monge-Ampere equation" - Conference on analysis and geometry, USTC, Hefei, China - 2015.

- "Two stories in differential geometry" - Special Colloquium, North Carolina State University, 2016.

- "Representability of Chern-Weil forms" - Complex Analytic Geometry, TIFR, 2017.

- "The Calabi-Yang-Mills equations" - Workshop in geometry and physics, IISc, 2017.

- "An extension of a theorem of Nori to Gauduchon astheno-Kähler manifolds" - Complex Analytic Geometry, TIFR, 2017.

- "A vector bundle version of the Monge-Ampère equation" - Colloquium, Christian-Albrechts-Universität zu Kiel, Germany 2018.

- "A vector bundle version of the Monge-Ampère equation" - Colloquium, ICTP, Trieste, Italy 2019.

- "Numerical criteria for generalised Monge-Ampère equations on projective manifolds" - Colloquium, ICTP, Trieste, Italy (online) 2020.

- "Two stories of PDE arising from differential geometry and physics" - Indian Academy of Sciences 2021.

- "Numerical criteria for the solvability of some fully nonlinear PDE" - Colloquium, UFRJ, Brazil (online) 2022.

- "The differential geometry of Hartshorne-ample bundles" - Colloquium, University of Oregon, USA (online) 2022.

- "Ampleness of vector bundles and canonical metrics" - Gauge theory, canonical metrics and geometric structures, Madrid, Spain 2023.

- "Numerical criteria for pointwise positivity" - Isaac Newton Institute, Cambridge, UK 2024.

- "Gravitating vortices and cosmic strings" - Index theory and complex geometry, National University of Singapore, Singapore 2024.

TEACHING

Courses taught at IISc

1. UM 204 (Introduction to Analysis, Spring 2017)

2. MA 338 (Differentiable manifolds, Autumn 2017)

3. MA 339 (Geometric Analysis, Spring 2018, Spring 2020)

4. UM 203 (Introduction to Algebraic Structures, Spring 2019)

5. MA 219 (Linear Algebra, Autumn 2019)

6. Lectures in calculus (2019) in IISc Challakere campus.

7. UM 102 (Analysis and Linear Algebra-2, Spring 2021, Spring 2022)

8. MA 235 (Introduction to Manifolds, Spring 2024)

9. MA 200 (Multivariable calculus, Autumn 2022, Autumn 2023)

10. MA 235 (Introduction to differentiable manifolds, Spring 2024)

11. MA 333 (Riemannian geometry, Autumn 2024)

12. MA 241 (Ordinary Differential Equations, Spring 2025)

Expository workshops, seminars, and mini-courses

1. NCM Workshop on Differential Geometry (July 2017), IISER Pune.

2. Lectures on Linear ODE and Stability in an Academy workshop in MES College (March 2018).

3. ATM School (June 2018) on Several Complex Variables, IISc.

4. AIS School (July 2019) on Riemannian geometry, IISc.

5. Cauchy Riemann Equations in Higher Dimensions (July 2019), ICTS.

6. AIS School (Dec 2019) on Geometric Analysis, IIT Bombay.

7. 5th Geometry-Topology Summer School (Online, July 2020), Istanbul Center for Mathematical Sciences.

8. A course on Real Analysis taught at ISB Hyderabad (a CSIC consultancy project) - 2020, 2021.

9. Lectures on similarities and differences between Real and Complex Analysis (online) for Refresher Course by Ramanujan College, Feb 2021.

10. AIS school on Lie groups and Lie algebras (June 2022), IISc.

SERVICE

Professional service

- Co-organised the IISc-IISER Pune Twenty-20 Symposium - 2021.

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- Area editor (Differential geometry), Journal of Indian Mathematical Society (2022-present)

- Co-organiser of the Johns Hopkins-University of Maryland College Park joint seminar in Complex geometry (2013-2016). Reviewer for Inventiones Mathematicae, Journal of Differential Geometry, Calculus of Variations and Partial Differential Equations, Journal of Geometric Analysis, Mathematische Zeitschrift, Bulletin of Mathematical Sciences, Sigma, Science China Mathematics, Geometriae Dedicata, International Mathematics Research Notices, Communications in Analysis and Geometry, Analysis Mathematica, Mathematics Student, Indian Journal of Pure and Applied Mathematics, Indian Journal of Physics, Zentralblatt Math, and Math Reviews.