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Swarnendu Sil

Positions

2020-Present **Assistant Professor**, *Department of Mathematics*
Indian Institute of Science (IISc), Bengaluru, India

2018-2020 **Post Doctoral Fellow**, *Forschungsinstitut für Mathematik (FIM), ETH*, Zürich, Switzerland

2016–2018 **Post Doctoral Fellow**, *Chaire d'Analyse mathématique et Applications, EPFL*, Lausanne, Switzerland

Education

2016 **PhD**, *École polytechnique fédérale de Lausanne*, Lausanne, Switzerland
Thesis advisor: Prof. Bernard Dacorogna

2012 **Master of Science**, *Tata Institute of Fundamental Research, Center for Applicable Mathematics*, Bangalore, India
Masters Thesis advisor: Prof. Muthusamy Vanninathan

2009 **Bachelor of Mechanical Engineering**, *Jadavpur University*, Kolkata, India

Awards and Honors

- 'Mathematics Doctoral Thesis Award 2016' for the best PhD thesis in Section de Mathématiques, EPFL.

Research Grants

- 'Regularity estimates for elliptic systems of differential forms' (2024 - 2027) – SERB-MATRICS MTR/2023/000885.

Research Interests

My research area is broadly Calculus of Variations, Partial Differential Equations and Geometric Analysis. I am interested in nonlinear elliptic systems and variational problems coming from geometry and physics.

Publications

Published Journal Articles

B. Sengupta and S. Sil. Morrey-Lorentz estimates for Hodge-type systems. *Discrete Contin. Dyn. Syst.*, 45(1):334–360, 2025.

S. Sil. Topology and approximation of weak G-bundles in the supercritical dimensions. *Adv. Math.*, 470:Paper No. 110229, 64, 2025.

S. Sil. Topology of weak G-bundles via Coulomb gauges in critical dimensions. *Comm. Anal. Geom.*, 32(3):791–835, 2024.

H. M. Nguyen and S. Sil. Limiting absorption principle and well-posedness for the time-harmonic maxwell equations with anisotropic sign-changing coefficients. *Comm. Math. Phys.*, 379:145–176, 2020.

S. Sil. Nonlinear Stein theorem for differential forms. *Calc. Var. Partial Differential Equations*, 58(4):58:154, 2019.

S. Sil. Calculus of variations: A differential form approach. *Adv. Calc. Var.*, 12(1):57–84, 2019.

G. Csato, B. Dacorogna, and S. Sil. On the best constant in Gaffney inequality. *J. Funct. Anal.*, 274(2):461–503, 2018.

S. Sil. Regularity for elliptic systems of differential forms and applications. *Calc. Var. Partial Differential Equations*, 56(6):56:172, 2017.

S. Bandyopadhyay and S. Sil. Exterior convexity and classical calculus of variations. *ESAIM Control Optim. Calc. Var.*, 22(2):338–354, 2016.

S. Bandyopadhyay and S. Sil. Notions of affinity in calculus of variations with differential forms. *Adv. Calc. Var.*, 9(3):293–304, 2016.

S. Bandyopadhyay, B. Dacorogna, and S. Sil. Calculus of variations with differential forms. *J. Eur. Math. Soc. (JEMS)*, 17(4):1009–1039, 2015.

Forthcoming

Accepted Journal Articles

D. Kumar and S. Sil. BMO estimates for Hodge-Maxwell systems with discontinuous anisotropic coefficients. *Nonlinear Anal.*, To appear.

Submitted Journal Articles

A. Balci, S. Sil, and M. Surnachev. Hodge Decomposition and Potentials in Variable Exponent Lebesgue and Sobolev Spaces. *arXiv e-prints, arXiv:2504.20772*, April 2025.

A. Mallick and S. Sil. Excess decay for quasilinear equations in the Heisenberg group and consequences. *arXiv e-prints, arXiv:2410.00764*, October 2024.

Teaching

Courses taught

- Introduction to Partial Differential Equations, Fall 2021, 2022
- Advanced functional analysis and PDEs, Spring 2022, 2025
- Introduction to the Calculus of Variations, Spring 2021, 2023
- Functional analysis, Fall 2023, 2024, 2025

Mentoring

PhD

- Rohit Mahato, 2024-Present.
- Sayan Adhikari, 2024-Present.

Post-Doctoral

- Dharmendra Kumar, Oct 2022-Feb 2024.
- Banhirup Sengupta, April 2023-Jan 2025.

MS Project

- Rohit Mahato, IISc Bangalore, Spring 2024.
- Srikar Valiveru, BITS Pilani, Fall 2023.
- Harish Upadhyay, IISER Tirupati, 2022-23.
- Ritvik Vantipalli, IISER Pune, 2022-23.

Other Professional Experience

Reviewer for Journals

Served/serving as a reviewer for submitted research articles for the journals

- Journal of the European Mathematical Society (JEMS).
- Analysis and PDE.
- Calculus of Variations and Partial Differential Equations.
- Transaction of American Mathematical Society
- Journal of Mathematical Analysis and Applications.
- Journal of Geometric Analysis.
- Nonlinear Differential Equations and Applications NoDEA.
- Journal of Geometry and Physics.
- Indian Journal of Pure and Applied Mathematics
- Journal of Mathematical Sciences.
- Proceedings-Mathematical Sciences.

Reviewer for Databases

Served/serving as a reviewer for zbMath.

Other Academic work

Served/serving as a

- Referee for the thesis of a PhD candidate in IIT Kanpur
- Reviewer for PMRF scheme PhD applications.
- Interview Panelist for NBHM MSc-PhD interviews

Personal Details

Date of Birth	9th May, 1984
Nationality	Indian
Sex	Male

Languages

Bengali	Native
English	Fluent, near native
French	Basic