Curriculum vitae **Dr. Hari Shankar Mahato**

Contact at:
Prof. Hari Shankar Mahato
Department of Mathematics
IIT Kharagpur
West Bengal - 721302
India

Phone (Office): +91 3222 283674
Mobile: +91 9874410176
E-Mail: hsmahato@maths.iitkgp.ernet.in
WWW: https://hsmahato.wordpress.com/
ResearchGate: tinyurl.com/z52gqtt
ORCID Id: 0000-0002-9187-8091

Personal Information

- Date of birth: 22.05.1986
- Gender: Male
- Marital status: Married, one son
- Nationality: Indian

Most Recent Positions

- February 2018 — Present: Assistant Professor in the Department of Mathematics at IIT Kharagpur, India.
- February 2016 — January 2018: Postdoc in the College of Engineering at the University of Georgia, USA.
- March 2015 — August 2015: Short term research associate at TU Dortmund, Germany.
- July 2013 — February 2015: Postdoc at the University of Erlangen-Nürnberg, Germany.
- June 2009 — June 2013: PhD student at the University of Bremen, Germany.
- February 2009 — March 2009: Intern at the University of Bremen, Germany.
- June 2008 — January 2009: Associate Software Engineer at eRevMax Technologies Pvt. Lt.d., India.

Education

- **PhD**
  Supervisor: Prof. Dr. habil. Michael Böhm
  Awarded by: Centre of Industrial Mathematics (**ZeTeM**)
  Department of Mathematics & Informatics
  University of Bremen, Germany
  June 2009 — May 2013
  Thesis title: *Homogenization of a system of nonlinear multi—species diffusion-reaction equations in an $H^{1,p}$ setting.*
  Grade: Magna cum Laude

- **Master of Science (MSc in Mathematics)**
  Awarded by: Indian Institute of Technology Kharagpur
  Kharagpur, India
  2006 - 2008
  Grade (GPA): 8.34/10.0
- **Bachelor of Science (BSc in Mathematics)**
  Awarded by: Sree Gopal Banerjee College
  Burdwan University, India
  2003 - 2006
  Grade (GPA): 64.4%

Research Interests

❖ **Applied Analysis**
- Partial Differential Equations
- Variational Methods
- Homogenisation Theory
- Flow in Porous Media
- Moving Interface Problems
- Numerical Simulation

❖ **Mathematical Biology**
- PK/PD Modeling
- Diabetic Nephropathy
- Kidney Injury
- Cardiovascular Disease Modelling

Awards, Honours & Grants

- **Achieved** highest ***GPA*** amongst 2 year M.Sc. Students (Mathematics) during 2006-2008.

- **Awarded** twice for securing highest marks during ***Graduation*** from department of mathematics at Sree Gopal Banerjee College.
- **Received** the joint award for the ***best project*** in M.Sc. in Mathematics.
- **Received** ***MCM Scholarship*** twice provided by IIT Kharagpur.
- **Received** the funding for PhD at the University of Bremen.
- **Won** the **POEMS** Travel Grant worth of £ 750 to visit University of Glasgow for two weeks.

Projects

- ***Master thesis***: *Laurent−Pade' Approximants and Chebyshev Finite Difference Methods for solving nonlinear ordinary differential equations*. **Supervision of**: Prof. Dr. P.V.S.N. Murthy.
- ***Ph.D. thesis***: *Homogenization of a system of nonlinear multi-species diffusion-reaction equations in an* $H^{1,p}$ *setting*. **Supervision of**: Prof. Dr. Michael Böhm.
- ***Postdoc work***: *Crystal dissolution and precipitation in a porous medium and moving interface problems - modelling, existence of solutions and micro-macro scale analysis.* In collaboration with: Prof. Dr. Peter Knabner and PD Dr. Serge Kräutle.
- ***Postdoc work:*** *Homogenization of plasmonic waves in metallic gratings inside meta-materials.*
- ***Postdoc work:*** *Drug development, mathematical modelling and numerical computations of renal physiology of animal and human models.* Project funded by **AstraZeneca**.

Employment

- **Worked** as an associate software engineer from June 2nd 2008 to January 23rd 2009 at eRevMax Pvt. Ltd., Kolkata, India.
- **PhD student** in the Centre of Industrial Mathematics at the University of Bremen from June 2009 to May 2013.
- **Postdoc** in the Chair of Applied Mathematics lead by Prof. Dr. Peter Knabner 1 at the University of Erlangen-Nürnberg from July 2013 to February 2015.
- **Offered** a **Postdoc** position at the University of Kassel, Germany in August 2014 — **Rejected**.

- **Offered** a **research associate** position at the University of Erlangen-Nürnberg, Germany in February 2015 — **Rejected**.

- **Offered** a **Postdoc** position at the Forschungszentrum Jülich, Germany in March 2015 — **Rejected**.

- **Research associate** in the Chair of Analysis at the TU Dortmund, Germany from March 2015 till August 2015.

- **Offered** a **Postdoc** position at the Federal University of São Carlos, Brazil in September 2015 — **Rejected**.

- Since February 2016 working as a **Postdoc** in the College of Engineering at the University of Georgia.

Computer Skills

- Operating systems: Windows, Linux and Mac OS X.
- Programming languages: Fortran, C, C++, HTML, XML.
- Mathematical softwares: COMSOL Multiphysics, MATLAB, Mathematica and R.
- For documentation: Latex, MS Office, Open Office, Adobe Photoshop, Corel Draw.

Language Proficiency

- English (Mother tongue).
- German (Fluent/B2 level).
- Hindi (Mother tongue).
- Others such as Spanish, Bengali.

Teaching Experience

- Supervision of B.Sc. students on small projects in Mathematical modelling which includes problems like modelling of type 2 diabetes, elasticity problems, laser welding etc. during winter semesters of 2010/2011, 2011/2012, 2012/2013.

- Supervision of internship students on projects like flow in porous media, homogenisation of PDEs, Prey-Predator models etc. during summer semester of 2010, 2011, 2012.

- Tutor (teaching assistant) for first year bachelor students in engineering for Analysis 1 during winter semester 2013/2014.
- Tutor (teaching assistant) for first year bachelor students in engineering for Analysis 2 during summer semester 2014.

- Teaching assistant for M.Sc. students for Introduction to functional analysis and topological vector spaces during summer semester 2014.

Leadership and Team Work

- Supervised internship students on several small projects related to homogenisation of PDEs originating from the heat conduction and transport processes inside the heterogeneous materials.

- Representative for the community of Indian students at the University of Bremen.

- Placements representative for 2 year M.Sc. students at the department of Mathematics during 2007-2008, IIT Kharagpur.

- Represented Mathematics department for my college during the visit of '***National Assessment and Accreditation Council of India (NAAC)***'.

- Participated in several science exhibitions, wall magazines, sports and other cultural festivals in college and at the university.

Conferences and Invited Talks

- Worked as an internship student at the ***Centre of Industrial Mathematics, University of Bremen*** from February 1 to March 31, 2009.
- Attended ***International Conference on Evolution Equations*** in Schmitten (Germany) in October, 2010 organized by ***TU Darmstadt.***
- Delivered a poster presentation at **33rd** ***North Germany Colloquium*** *on* ***Applied Analysis*** *and* ***Numerical Mathematics*** in Rostock in May, 2012.
- Invited for a talk in an ***ICMS*** (International Center for Mathematical Sciences) Workshop on Scale Transitions in Chemistry and Biology, in ***Edinburgh***, UK during June 4 to June 8, 2012.
- Delivered a talk in the annual meeting of ***German Mathematical Society*** in ***Saarbrücken*** in September, 2012.
- Delivered a talk at ***6th GAMM Seminar on Multi-scale Material Model*** in Magdeburg in September, 2012.

- Delivered a talk at the ***Chair of Applied Mathematics 1*** at the ***University of Erlangen*** on January 10, 2013.

- Attended ***Basel Junior Symposium on Analysis*** organised by the ***University of Basel*** from February 12 to February 14, 2013 in Basel.

- Delivered a talk at ***Langenbach-Seminar*** at ***WIAS Berlin*** on March 13, 2013.

- Delivered a talk in the ***Department of Mathematics*** at the ***University of Saarbrücken*** on April 18, 2013.

- Delivered a talk at **34th** ***North Germany Colloquium*** *on* ***Applied Analysis*** *and* ***Numerical Mathematics*** at ***TU Clausthal*** from May 3 to May 4, 2013.

- Doctoral Colloquium (defense) at the ***University of Bremen*** on May 17, 2013.

- Invited for the Poster Presentation at ***Fifth International Conference on Porous Media and Annual Meeting of the International Society for Porous Media (InterPore)*** in Prague from May 20 to May 24, 2013.

- Delivered a talk at the **Equadiff 2013** conference from August 26 to August 30, 2013 in **Prague, Czech Republic.**

- Delivered a talk at **Forschungszentrum Jülich, Germany** in September 12, 2013.

- Delivered a talk at the Faculty of Mathematics at the **University of Würzburg, Germany**

- Delivered a talk at the **Martin-Luther University of Halle** during a workshop on "**Maxwell-Stefan meets Navier-Stokes**" from March 31 to April 2, 2014.

- Delivered a talk at the **TU Dortmund**, **Germany** in the **"Oberseminar on Analysis and PDEs"** on August 21, 2014, organised by Prof. Ben Schweizer and Prof. Matthias Röger.

- Delivered a talk at the **University of Kassel, Germany** in the group of Prof. Dorothee Knees on August 22, 2014.

- Delivered a talk at the **Indian Institute of Science Bangalore, India** in the group of Prof. A. Nandakumaran on December 9, 2014.

- Delivered a talk at the **Jacobs University, Germany** in the group of Prof. Marcel Oliver on October 6, 2015.

- Delivered a talk at the **Indian Institute of Technology Kharagpur, India** in the Department of Mathematics on December 22, 2015.

- Visited **AstraZeneca Pharmaceuticals, Boston** for three days on project collaboration from March 14, 2016 to March 16 2016.

- Delivered a talk and a poster presentation at the **ACoP7** (American Conference on Pharmacometrics) at **Bellevue, WA** from October 23 to October 26, 2016.

- Delivered a talk in the **Department** of **Mathematics** at the University of Georgia on April 3, 2017.

- Delivered a talk in the **School** of **Chemical, Materials** and **Biomedical Engineering** at the University of Georgia on September 18, 2017.

- Delivered a poster presentation at the **Kidney Week** organized by **American Society** of **Nephrology** in New Orleans from October 31, 2017 till November 5, 2017.

Conferences, workshops and seminars organised

- Invited external guests and organized our group's weekly seminar.
- Participated to organize the mini symposium on the occasion of 60th birthday of Prof. Dr. Peter Knabner, July 2014.
- Participated to organize the first kick-off meeting "Mini-Workshop Münster-Dortmund to wave propagation" between University of Münster and TU Dortmund, March 2015.

Editorial work

- Referee for Electronic Journal of Differential Equations.
- Referee for Asian Journal of Mathematics and Computer Research.
- Editor of Journal of Applied Mathematics and Statistical Applications

Publications

❖ Published / Accepted Articles

- H. S. Mahato, M. Böhm. *Global existence and uniqueness of a system of nonlinear multi-species diffusion-reaction equations in the presence of homogeneous Neumann boundary conditions in an H^{1,p} setting*. **Journal of Applied Analysis and Computation**, Vol. 3, No. 4, pp 357 — 376, 2013.

- H. S. Mahato, M. Böhm. *Homogenization of a system of semilinear diffusion-reaction equations in an H^{1,p} setting*. **Electronic Journal of Differential Equations**, Vol. 2013 (2013), No. 210, pp 1 -– 22.

- H. S. Mahato and M. Böhm. *An existence result for a system of coupled semilinear diffusion-reaction equations with flux boundary conditions*. **European Journal of Applied Mathematics**, Cambridge University Press, pp 1 –- 22, 2014. doi: 10.1017/S0956792514000369.

- H. S. Mahato. *Existence and averaging of a system of nonlinear parabolic equations with mixed Neumann-Robin interface conditions*. **Advances and Applications in Fluid Mechanics**, 19 (2), pp 473 — 488, 2016. DOI: http://dx.doi.org/10.17654/FM019020473.

- H. S. Mahato, N. Ray, R. Schulz, F. Frank, P. Knabner. *Strong solvability up to clogging of an effective diffusion--precipitation model in an evolving porous medium.* **European Journal of Applied Mathematics**, Cambridge University Press, pp 1 — 29, 2016. DOI: 10.1017/S0956792516000164.

- H. S. Mahato. *Numerical simulations for a two−scale model in a porous medium.* **Numerical Analysis and Applications.** Springer Publication, Vol. 10, No. 1, 2017**.**

- H. S. Mahato. *Upscaling of Helmholtz equation originating in transmission through metallic gratings in meta-materials*. **The Scientific World Journal, Volume 2016 (2016), Article ID 7436136, 14 pages. DOI:** http://dx.doi.org/10.1155/2016/7436136.

- H. S. Mahato, M. Böhm, S. Kräutle, P. Knabner. *Homogenization of a system of multi-species diffusion-reaction-dissolution-precipitation equations in the presence of inflow-outflow boundary conditions*. **Advances in Mathematical Sciences and Applications**, Vol. 26, No. 1, pp 39–81, 2017.

- H. S. Mahato. *A note on extension type theorems in homogenization of periodic domains.* **N-W European Journal of Mathematics**, Vol 3, pp 107–122, 2017.

- H.S. Mahato, L. Banas. *Homogenization of Cahn-Hilliard type equations in a perforated porous medium.* **Asymptotic Analysis**, 105(1-2), pp. 77-95, (2017).

- H. S. Mahato, S. Kräutle, P. Knabner. *Evolving micro-structures in a porous medium: upscaling via a rigorous level set approach*. Submitted to SIAM Journal of Applied Mathematics, 2017.

- H. S. Mahato, C. Ahlström, R. Jansson-Löfmark, U. Johansson, G. Helmlinger, M. Hallow. *Mathematical model of hemodynamic mechanisms and consequences of glomerular hypertension in diabetic mice.* Submitted to **NPJ Systems Biology and Applications**, 2017.

❖ **Papers presented at Conferences**

- H. S. Mahato. *A homogenization approach to a system of semilinear diffusion-reaction equations in a porous medium*. Preprint available at: http://tinyurl.com/p6bjbhv.

❖ **Preprints / Under preparation Articles**

- H. S. Mahato. *Optimal exponents of nonlinearity in a diffusion-reaction equations in a Lipschitz domain incorporated with mixed boundary conditions.* In preparation.

- H.S. Mahato, A. Nandakumaran. *Optimal control of boundary fluxes in a porous medium flow problem: an approach to obtain the existence of solution and upscaled equations.* In preparation.

- H.S. Mahato, G.P. Raja Sekhar. *A homogenization approach to the effect of surfactant concentration and interfacial slip on the flow past of viscous drops in a porous medium.* In preparation.

- H.S. Mahato, S. Reichelt. *Upscaling of Cahn-Hilliard equations in non-periodic media.* In preparation.

- H.S. Mahato, Melissa K. Hallow. *Mathematical modelling for preclinical studies of animal models in drug development*. To be submitted.

❖ **Theses**

- H. S. Mahato. *Homogenization of a system of nonlinear multi-species* ***diffusion-reaction*** *equations in an* $H^{1,p}$ *setting*, Doctoral Dissertation, University of Bremen, Germany, 2013. Thesis is available at: http://elib.suub.uni-bremen.de/edocs/00103256-1.pdf.

- H. S. Mahato. *Chebyshev polynomial and nonlinear ordinary differential equations*, Master thesis at Indian Institute of Technology Kharagpur, India, 2008. Supervised by Prof. P.V.S.N. Murthy.

Kharagpur, 24.03.2018 — *Hari Shankar Mahato*
(Place, date) — (Signature)