

Gopikrishnan C. R.

Resume

October 12, 2020

Curriculum Vitae

Given names: **Gopikrishnan**

Last name: **Chirappurathu Remesan**

Citizenship: Indian

Languages: Malayalam (mother tongue), English (fluent)

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Qualification

Integrated BS - MS Dual Degree

2010 - 2012 **Bachelor of Science (Biology, Chemistry, Physics and Mathematics)**, *Indian Institute of Science Education and Research*, Thiruvananthapuram, India, CGPA - 8.65 (out of 10) up to 4th semester.

2012 - 2015 **Master of Science (Mathematics)**, *Indian Institute of Science Education and Research*, Thiruvananthapuram, India, CGPA - 8.58 (out of 10).

Doctor of Philosophy (ongoing)

2016 July - **Doctor of Philosophy (Mathematics)**, *IITB - Monash Research Academy*, Joint doctoral programme by Indian Institute of Technology Bombay India and Monash University Australia on the topic “*Numerical methods for free boundary problems in three dimensions with applications in biology.*”

Advisers Prof. Jérôme Droniou (Monash University), A/Prof Jennifer A. Flegg (University of Melbourne), Prof. Neela Nataraj (IIT Bombay)

Experience

01, June 2015 - 12, July 2016 **Visiting Lecturer**, *Bishop Chulapparambil Memorial College Kottayam*, Kerala, India.

Honours and awards

- 2010 - 2015 **INSPIRE** (Innovation in Science Pursuit for Inspirational Research) Fellowship (Department of Science and Technology, Government of India), Registration Number - DST/INSPIRE-SHE/IISER-T/2008
- 2012 - 2015 **Institute Silver Medal**, For best academic performance and highest CGPA, School of Mathematics, IISER Thiruvnanthapuram.
- June 2015 **CSIR - JRF with NET¹**, All India Rank - 89
- December 2015 **CSIR - JRF with NET**, All India Rank - 43
- June 2016 **CSIR - JRF with NET**, All India Rank - 123
- January 2016 **GATE - Mathematics²**, All India Rank - 103

Research interest

My research interests span from mathematical modelling of different physical problems (with special interest on problems from life sciences), design and implementation of numerical schemes, and theoretical and numerical analysis. I conduct theoretical and numerical analysis of systems that contain all or pairs of hyperbolic, elliptic, and parabolic partial differential equations. Usually, such systems originate from modelling biological phenomena using multiphase fluid flows and multiphase mixture theory. Appropriate combinations of finite volume, finite element, and finite difference methods are used to design numerical schemes. In my research, I use various compactness techniques to carry out convergence analysis of numerical schemes and establish the existence of weak solutions to tightly coupled problems.

Publications

- [1] G. C. Remesan. Numerical solution of the two-phase tumour growth model with moving boundary. In B. Lamichane, T. Tran, and J. Bunder, editors, *Proceedings of the 18th Biennial Computational Techniques and Applications Conference, CTAC-2018*, volume 60 of *ANZIAM J.*, pages C1–C15, 2019. URL <https://doi.org/10.21914/anziamj.v60i0.13936>.
- [2] J. Droniou, J. Flegg, and G. C. Remesan. Numerical solution of a two dimensional tumour growth model with moving boundary. *ArXiv [accepted in Journal of Scientific Computing]*, abs/2001.01949, 2020. URL <https://arxiv.org/abs/2001.01949>.
- [3] J. Droniou, N. Nataraj, and G. C. Remesan. Convergence analysis of a numerical scheme for a tumour growth model. *ArXiv [In review: IMA Journal of Numerical Analysis]*, abs/1910.07768, 2019. URL <https://arxiv.org/abs/1910.07768>.
- [4] G. C. Remesan. Strong bounded variation estimates for the multi-dimensional finite volume approximation of scalar conservation laws. *ArXiv [In review: M2AN: Mathematical Modelling and Analysis]*, abs/2004.12346, 2020. URL <https://arxiv.org/abs/2004.12346>.
- [5] J. A. Flegg G. C. Remesan. A two phase model for stress dependent tumour growth. *[In preparation.]*.

- [6] G. C. Remesan, D. Jose, and A. Datta. Electronic structure, lattice energies and born exponents for alkali halides from first principles. *AIP Advances*, 2(1):012131, 2012. doi: 10.1063/1.3684608. URL <https://doi.org/10.1063/1.3684608>.

Technical skill

Programming Language C, C++, Python
Softwares MATLAB, Mathematica, L^AT_EX, Paraview
Operating Systems Linux, Microsoft

Teaching interests

Real analysis
Ordinary and partial differential equations

Numerical analysis
Multivariable calculus

Teaching assistantships at IIT Bombay

- Calculus (IIT Bombay, B.Tech. first year, 2018)
- Numerical analysis (IIT Bombay, B.Tech. second year, 2018)
- Numerical analysis (IIT Bombay, M.Sc. first year, 2019)
- Numerical analysis (IIT Bombay, M.Sc. first year, 2020)

Talks

- August 2015 Resource person for a talk on the topic '*Measure Theory - When observed from grounds*' at St. Stephans College Kottayam, Kerala, India
- November 2017 Popular talk on mathematics on the topic '*Buffon's needle problem and what is so harmonic*', IIT Bombay, India.
- October 2018 Postgraduate student talk on the topic '*Mathematics and medicine : the common 'M'*', Monash University, Australia.
- November 2018 As a part of CTAC 2018 conference on the topic - '*Numerical solution of the two-phase tumour growth model with moving boundary (1-spatial dimensional study)*', Newcastle, Australia.
- April 2019 Talk as a part of MCB lecture series on the topic '*Numerical solution of a two-phase tumour growth model with moving boundary (2 spatial dimensional study)*', University of Melbourne, Australia.
- June 2019 Talk on '*Numerical solution of a two-phase tumour growth model in two spatial dimensions*', MAFELAP 2019, Brunnel University, London
- June 2019 Informal talk on '*Numerical solution of a two-phase tumour growth models*', School of Mathematics, University of Oxford, London
- December 2019 Workshop on '*Data visualisation using Matlab*', IIT Bombay (Research Scholars Forum), India

- December 2019 Talk on ‘*Overdetermined systems of linear equations*’, B. C. M. College, Kottayam, India
- February 2020 Talk on ‘*Numerical solutions of a two dimensional tumour growth model*’, ANZIAM 2020, New Castle, Australia
- February 2020 Talk on ‘*Convergence analysis of a two-phase tumour growth model*’, MWN-DEA 2020, Monash University, Australia

Projects

Master of Science

Title **A theoretical and numerical study of stochastic delay integro differential equations**

Advisor Prof. M. P. Rajan, Professor, School of Mathematics, IISER Thiruvananthapuram, India.

Master of Science (for minor degree in physics)

Title **Universal behavior of quantum discord as a function of measurement strength**

Advisor A/Prof. Anil Shaji, Associate Professor, School of Physics, IISER Thiruvananthapuram, India.

Workshops, Seminars and Conferences

- December 2013 Workshop - winter school in probability, Indian Statistical Institute Kolkata, India.
- August 2015 Refresher course for College teachers in Kerala (Topology), Kerala School of Mathematics, India.
- June 2017 Conference: Recent advances in PDE: theory, computations and applications, IIT Bombay, India.
- March 2018 Workshop: New directions in PDE constrained optimisation, IIT Bombay, India.
- November 2018 Conference: Computational Techniques and Applications Conference, Newcastle, Australia.
- Februday 2019 Workshop: Python for mathematics, Monash University, Australia.
- June 2019 Conference: Mathematics of Finite Elements and Applications - 2019, Brunel Univeristy, London
- August 2019 Workshop: Hyperbolic conservation laws - Theory and Numerics, TIFR-CAM, Bangalore, India
- February 2020 Conference: Australian and Newzealand Industrial and Applied Mathematics Conference, New Castle, Sydney, Australia
- February 2020 Workshop: Monash Workshop on Numerical Differential Equations and Applications, Monash University, Australia

References

- **Prof. Neela Nataraj**
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Indian Institute of Technology Bombay
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- **Prof. Jerome Droniou**
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- **A/Prof Jennifer Anne Flegg**
Senior Lecturer
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✉ jennifer.flegg@unimelb.edu.au

Notes

1. National level test conducted by the Council of Scientific and Industrial Research India (autonomous body under the ministry of human resource development) to screen post graduate for lectureship and doctoral research.
2. Graduate Aptitude Test in Engineering - conducted by the joint council of Indian Institute of Technologies and Indian Institute of Science Bangalore to screen students for post graduate education and doctoral research.