Gopikrishnan Chirappurathu Remesan

Résumé

March 9, 2023

Curriculum Vitae

Given names : **Gopikrishnan** Last name : **Chirappurathu Remesan**
Citizenship : Indian Date of birth : 26th May, 1992
Languages : Malayalam (first language), English (fluent)
Marital status : Married
Office address : Faculty Room 121, Dept. of Mathematics, Ahalia Integrated Campus, Indian Institute of Technology Palakkad, Kozhippara P. O., Palakkad, Kerala, India 678557

E-mail (O) : gopikrishnan@iitpkd.ac.in E-mail (P): gopi123krishnan@gmail.com
Webpage : https://gopikrishnancr.github.io/
Phone (M) : *+91 944 768 2762*

ORCiD: 0000-0002-4507-4463 Scopus ID: 57219814720 MR Author ID: 1405273

Current employment

1st Mar2023 (Ongoing) **Assistant Professor in Mathematics**, *Dept.of Mathematics, Indian Institute of Technology Palakkad*, Kerala, India

Education

Integrated BS – MS Dual Degree

2010 - 2012 **Bachelor of Science (Biology, Chemistry, Physics, and Mathematics)**, *Indian Institute of Science Education and Research*, Thiruvananthapuram, India, Cumulative grade point average - 8.65/10 up to 4^{th} semester

2012 - 2015 **Master of Science (Mathematics)**, *Indian Institute of Science Education and Research*, Thiruvananthapuram, India, Cumulative grade point average - 8.58/10

Doctor of Philosophy

2016 July - 2021 June **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 **"Modelling and numerical analysis of complex tumour growth problems"**,
Thesis defended on : June 18, 2021
PhD awarded on : August 7, 2021

See a Three – Minute Talk on my Ph.D. thesis.
See a One – Minute Animation on my Ph.D. thesis.

Thesis advisors IIT Bombay: Prof Neela Nataraj
Monash University: Prof Jerome Droniou, A/Prof Jennifer Flegg

Honours and awards

2021 July **Prof Prabhulal Bhatnagar Memorial Prize** (2020-2021) for being the most outstanding of all the students who completed the requirements for the degree of Doctor of Philosophy in Mathematics.

2020 August **First prize**, Three Minute Thesis Talk, IITB - Monash Research Academy.

2015 June **Institute Silver Medal**, For best academic performance and highest cumulative grade point average, School of Mathematics, IISER Thiruvananthapuram, Kerala, India.

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

National level examinations

Council of Scientific and Industrial Research - Junior Research Fellowship, June 2015 (All India Rank 89/768), December 2015 (All India Rank 43/934), June 2016 (All India Rank 123/1805).

Graduate Aptitude Test in Engineering – Mathematics, January 2016 (AIR 104/6305).

Experience

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

2016–2021 Teaching assistantships at IIT Bombay

- Calculus (IIT Bombay, B.Tech. first year, 2018)
- Numerical analysis (IIT Bombay, (B.Tech - II Year 2018), (M.Sc. - I Year 2019 & 2020))
- Programming Lab (Fortran) (IIT Bombay, M.Sc. first year, 2021)

April 2021 - June 2021 **Research associate**, *Dept. of Mathematics, Indian Institute of Technology Bombay*, Maharashtra, India

July-Dec 2021 **Postdoctoral fellow**, *Dept. of Mathematics, Indian Institute of Technology Bombay*, Maharashtra, India

Topic: Numerical analysis of finite element methods for phase field crystal equations, a priori and a posteriori error estimates for finite element methods for fourth order semilinear partial differential equations. Mentor: Prof Neela Nataraj.

1st Jan 2022 - 31st Jan 2023 **Post doctoral fellow**, *Dept. of Mathematics "F. Enriques", Via C. Saldini 50, Universita Degli Studi di Milano*, Italy

Topic: Development, analysis, and numerical testing of a posteriori estimates, near best approximation in a given, possibly nonconforming discrete solution space, best error localizations in the adaptive solution of a nonlinear partial differential equation with arbitrary variational data. Mentor: Prof Andreas Veeser.

Research interest

Main research interest are mathematical modelling of different physical problems (with focus on problems from life sciences), design and implementation of numerical schemes, and theoretical and numerical analysis. This entails:

- Derivation of mathematical models using multiphase fluid flow and mixture theory, linear and nonlinear elasticity.
- Design of numerical schemes using appropriate combinations of finite volume, finite element, and finite difference methods.
- Rigorous theoretical and numerical analysis of physical models with hyperbolic, elliptic, and parabolic partial differential equations.

Another research interest is numerical analysis of nonlinear elliptic partial differential equations.

Publications

Published articles

[1] G. C. Remesan. "Strong bounded variation estimates for the multi-dimensional finite volume approximation of scalar conservation laws". In: *ESAIM:M2AN* 55.4 (2021). URL: https://doi.org/10.1051/m2an/2021027.

[2] J. Droniou, N. Nataraj, and G. C. Remesan. "Convergence analysis of a numerical scheme for a tumour growth model". In: *IMA J. Numer. Anal.* 42.2 (2022). URL: https://doi.org/10.1093/imanum/drab016.

[3] J. Droniou, J. Flegg, and G. C. Remesan. "Numerical solution of a two dimensional tumour growth model with moving boundary". In: *J. Sci. Comp.* 85.20 (2020). URL: https://doi.org/10.1007/s10915-020-01326-6.

[4] G. C. Remesan. "Numerical solution of the two-phase tumour growth model with moving boundary". In: *ANZIAM J.* 60 (2019), pp. C1–C15. URL: https://doi.org/10.21914/anziamj.v60i0.13936.

[5] H. M. Byrne, J. A. Flegg, and G. C. Remesan. "Two phase model for compressive stress induced on a surrounding medium by an expanding tumour". In: *J. Math. Bio.* 86.1 (2022). URL: https://link.springer.com/article/10.1007/s00285-022-01851-y.

Submitted articles

[6] C. Carsten, N. Nataraj, G. C. Remesan, and D. Shylaja. "Unified a priori analysis of four second-order FEM for fourth order quadratic semilinear problems". In: *[Submitted to Numer. Math.]* (2022).

Preprints

[7] G. C. Remesan and J. A. Flegg. "Biphasic model for epidermal wound healing closure". In: *Pre-print* (2022).

Technical skill

Languages: C, C++, Python, Fortran **Software:** Matlab, Paraview, Alberta

Teaching interests

My teaching interests are ordinary and partial differential equations, mathematical analysis, numerical analysis, and multivariable calculus. In numerical analysis, special interests are **finite difference, finite volume,** and **finite element methods**. In differential equations, **variational theory based on Sobolev spaces** along with the classical theory of differential equations are topics of interest.

Talks and seminars

Invited talks

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.

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.

Contributed talks

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.

February 2020 — Talk on *'Numerical solutions of a two dimensional tumour growth model'*, Annual conference of ANZIAM 2020, New Castle, Australia.

February 2020 — Talk on *'Convergence analysis of a two–phase tumour growth model'*, MWNDEA 2020, Monash University, Australia.

January 2021 — Talk on *'Numerical solution of a tumour growth model in two spatial dimensions'*, Annual conference of AustMS, Australia.

February 2021 — Talk on *'Two–phase model for compressive stress induced on a surrounding hyperelastic medium by an expanding tumour'*, Annual conference of ANZIAM 2021, Australia.

December 2022 — Talk on *'Strong BV estimates for finite volume solutions of multidimensional conservation laws'*, Annual conference of BRICS 2022, India.

February 2022 — Talk on *'Two-phase model of wound healing'*, Annual conference of ANZIAM 2022, Australia.

August 2022 — Talk on *'Convergence analysis of a two-phase tumour growth model'*, CMAM 2022, TU Wien, Vienna, Austria.

Projects

Bachelor of Science

Title **Electronic structure, lattice energies and Born exponents for alkali halides from first principles**, AIP Advances, 2(1), 2012, URL https://doi.org/10.1063/1.3684608.

Advisor Prof Ayan Datta, Professor, Indian Association for the Cultivation of Sciences, India

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 behaviour of quantum discord as a function of measurement strength**

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

References

1. Prof Andreas Veeser, Professor, Department of Mathematics, University of Milan, Italy.
   ☎ : +39 02 503 16186, ✉ : andreas.veeser@unimi.it
2. Prof Neela Nataraj, Institute Chair Professor, Dean (Faculty Affairs), Dept. of Mathematics, Indian Institute of Technology Bombay, Mumbai, Maharashtra, India.
   ☎ : +91 2576 7468, ✉ : neela@math.iitb.ac
3. Prof Jerome Droniou, Professor, School of Mathematics, Monash University, Australia.
   ☎ : +61 3 9905 4489, ✉ : jerome.droniou@monash.edu
4. A/Prof Jennifer Flegg, Associate professor, School of Mathematics and Statistics, University of Melbourne, Australia.
   ☎ : +61 3 8344 7523, ✉ : jennifer.flegg@unimelb.edu.au