Jorge M. Ramirez

Applied Mathematician

Oakridge National Laboratory,
P.O. Box 2008,
Oak Ridge, TN 37831

email: ramirezosojm@ornl.gov
https://csmd.ornl.gov/profile/jorge-ramirez
https://orcid.org/0000-0002-0402-7484

Employment

Current

- ◇ **R& D Staff at Oakridge National Laboratory**, Mathematics in Computation Section, Systems and Decision Sciences Group. Since February 2022.
- ◇ **Associate Professor of Mathematics** at the School of Sciences, Universidad Nacional de Colombia, Sede Medellín. Full time position with dedication evenly split into research and teaching; including advising of undergraduate and graduate students. Since August 2009.

Previous

- ◇ Mathematics Mentor for the **Eco-Informatics Summer Institute**. H.J. Andrews Experimental Forest, Oregon State University. Blue River, OR. June-August 2009-2012 and 2014.
- ◇ **Post-Doctoral Researcher** at the Department of Mathematics, University of Arizona. Richard S. Pierce Fellowship. Tucson, Arizona. August 2007 - August 2009.

Consultant

- ◇ **Scientific Consultant in mathematical modeling of human nutrition and physiology** for Nutrino Research Co. July 2016 - 2018.
- ◇ **Collaborative Research: A Lagrangian Description of Breaking Ocean Surface Waves from Laboratory Measurements and Stochastic Parameterizations.** Consultant. NSF Award No. DNS-1524241 to Oregon State University under the direction of Juan Restrepo - Mathematics, OSU. November 2014 - November 2016

Project funding

- ◇ **Tools for contextualized mathematics in engineering education.** Coordinator. Project funded by UNALMED. June 2020 - June 2021.
- ◇ **Spontaneous formation of geometric patterns in the dynamics of multiple mobile individuals under quimiotaxis.** Principal Investigator. Project funded by Colciencias. October 2016 - December 2017.
- ◇ **Applied stochastic process to environmental risk problems.** Principal Investigator. Project awarded by the Institutional Links Program of the Newton–Caldas Fund to the University of Liverpool and Univesidad Nacional de Colombia. June - July 2015.

- ◇ **Quantifying the evolution of risk associated with hydro-climatological processes and their response to our changing climate**. Principal Investigator. Project funded by the Researcher Links program of the British Council to the University of Liverpool and Universidad Nacional de Colombia. August - December 2014.
- ◇ **Functional Gene network Reconstruction from Heterogeneous Data** Co-investigator. Grant awarded to Universidad Nacional de Colombia by Banco de la República, Colombia. January 2013 - January 2014.
- ◇ **Collaborative Research: Nonparametric Theory on Manifolds of Shapes and Images, with Applications to Biology, Medical Imaging and Machine Vision**. Senior Personnel. NSF Award No. DNS-0506011 to The University of Arizona under the direction of Rabindra Bhattacharya - Mathematics, UofA. July 2008 - July 2009.
- ◇ **Collaborative Research (CMG): Mathematical Theory and Modeling of Wave-Current Interactions**. Project No. 2090GJC459 sponsored by the University of California and the University of Arizona. May 2008 - July 2008.

Education

- ◇ Ph.D. in Mathematics, Oregon State University. Thesis title: **Skew Brownian motion and branching processes applied to diffusion-advection in heterogenous media and fluid flow**. Co-Advisors: Enrique Thomann and Edward Waymire. July 2007.
- ◇ M.Sc in Mathematics, Oregon State University. Master Paper: **Monte Carlo simulation of multiplicative cascades (application to two partial differential equations)**. Co-Advisors: Enrique Thomann and Edward Waymire. 2002-2004.
- ◇ **Civil Engineer**, Universidad Nacional de Colombia, Sede Medellín. 1996-2002.
- ◇ **High school with emphasis in mathematics**, Colegio Salesiano El Sufragio, Medellín, 1994.

Scholarship and Creative Activity

Awards

- ◇ **Wolfram Innovator Award**. Wolfram Inc., Champaing, IL, U.S.A., 2018
- ◇ **Excellence in Teaching**. School of Sciences, Universidad Nacional de Colombia, Sede Medellín, 2018

◇ **Courtesy Associate Professor**. Department of Mathematics, Oregon State University, 2015–2016

◇ **Honorary Research Fellow**. Department of Mathematical Sciences, University of Liverpool, 2014

Submitted

◇ **Homotopy sampling, with an application to particle filters.** Restrepo J.M., Ramirez J.M. Accepted for publication to International Journal of Uncertainty Quantification.

◇ **A Mathematical Assessment of the Isolation Tree Method for Anomaly Detection in Big Data**. Morales F.A., Ramirez J.M., Ramos, E. Submitted to Transactions on Knowledge Discovery in Data.

Published

◇ **A conceptual stochastic rainfall-runoff model of an order-one catchment under a stationary precipitation regime**. Vallejo S.M. Ramirez, J.M., Poveda, G. Stochastic Environmental Research and Risk Assessment, 35, 11, 2187-2212.

◇ **Dynamics of drainage under stochastic rainfall in river networks.** Ramirez J.M, Costantinescu, C. Stochastics and Dynamics, 2020, 20550042.

◇ **An Application of Fractional Differential Equations to Risk Theory**. Constantinescu, C., Ramirez, J.M., Zhu, W.R. Finance and Stochastics. 2019, pp. 1–24

◇ **Transport due to Transient Progressive Waves.** Restrepo J.M, Ramirez, J.M. Journal of Physical Oceanography (49) 2019, pp. 2023–2336

◇ **Modelling the Mass Exchange Dynamics of Oceanic Surface and Subsurface Oil**. Ramirez J.M., Moghimi S., Restrepo J.M. Ocean Modelling (129) 2018, pp. 75-92.

◇ **A Multi-cultural Science Education Model for Sustainability at the National University of Colombia, Medellin**. Ramirez J.M, Gupta V.K, Mesa O.J., Poveda G., Saldarriaga J., Gupta I. and Arias P. Systems Research and Behavioral Science. 2017, 34 (5) 2017, p 577?584

◇ **Tangential fluid flow within 3D narrow fissures: Conservative velocity fields on associated triangulations and transport processes**. Morales F.A, Ramirez J.M. Mathematical Methods in the Applied Sciences. 2017, 18(40), p 6316?6331.

◇ **Continuity of local time: an applied perspective** J. M. Ramirez, E. C. Waymire, E. A. Thomann. In: "The fascination of Probability, Statistics and Their Applications. In honour of Ole E. Barndorff-Nielsen on his 80th birthday". Springer Verlag, 2016.

◇ **An oil fate model for shallow waters** J. Restrepo, J. M. Ramirez, S. Venkataramani. Journal of Marine Science and Engineering. 3, 1504-1543, 2015

- ◇ **Algorithm for the construction of a global enzymatic network to be used for gene network reconstruction** A. Quintero, J. M. Ramirez, L.G. Leal and Lopez-Kleine, L.Current Genomics 15.5, 400–407, 2014.
- ◇ **On the path properties of a lacunary power series.** G. Jensen, Ch. Pommerenke, J. M. Ramirez. Proceedings of the American Mathematical Society. 142(5), 1591–1606, 2014.
- ◇ **Advection-Dispersion across interfaces.** J. M. Ramirez, E. Thomann, E. Waymire. Statistical Science. 28(4) 487–509, 2013.
- ◇ **Green's functions for Sturm-Liouville problems of directed tree graphs.** J. M. Ramirez. Revista Colombiana de Matemáticas. 46(1):15 – 25, 2012.
- ◇ **Population persistence under advection-diffusion in river networks.** J. M. Ramirez. Journal of Mathematical Biology. 65(5):919 – 942, 2011.
- ◇ **Multi-skew Brownian motion and diffusion in layered media**. J. M. Ramirez. Proceedings of the American Mathematical Society. 139 (10) (2011), 3739-3752.
- ◇ **Multi-scale Momentum Flux and Diffusion due to Whitecapping in Wave/Current Interactions.** J. Restrepo, J. M. Ramirez, J. McWilliams, M. Banner. Journal of Physical Oceanography. 139 (10), 837–856, 2011
- ◇ **A note on the theoretical foundations of particle tracking Methods in Heterogeneous Porous Media**. J. M. Ramirez, E. Thomann, E. Waymire, J. Chastanet, B. Wood. *Water Resources Research*,44, W01501, 2008
- ◇ **A generalized Taylor-Aris formula and skew diffusion**. J. M. Ramirez, E. Thomann, E. Waymire, R. Haggerty, B. Wood. *Multiscale Modeling and Simulation: A SIAM Interdisciplinary Journal*, 5(3), 786-801, 2006.
- ◇ **Multiplicative cascades applied to PDEs (two numerical examples)**. J.M. Ramirez. *Journal of Computational Physics*, 214, 122–136, 2006.