Heyrim Cho

Department of Mathematics, University of California, Riverside, CA
Room 1220 Multidisciplinary Research Bldg • heyrimc@ucr.edu

APPOINTMENTS

Assistant Professor, University of California, Riverside, CA, USA	**July 2019 - present**
Brin Postdoc Fellow, University of Maryland, College Park, MD, USA	**Aug 2015 - May 2019**
Research Assistant, Department of Nuclear Medicine, Seoul National University Hospital	**Jan 2009 - Jun 2009**

EDUCATION

Ph.D. in Applied Mathematics Brown University, Providence, RI, USA **May 2015**
  Thesis: High-Dimensional Response-Excitation PDF Methods for Uncertainty Quantification and Stochastic Modeling (Advisor: Professor George E. Karniadakis)

Sc.M in Applied Mathematics Brown University, Providence, RI, USA **May 2011**

M.S. in Mathematics Korea Advanced Institute of Science and Technology (KAIST), South Korea **Aug 2009**
  Thesis: Implementation of Dual Iterative Substructuring methods on a Parallel computer
       (Advisor: Professor Chang-Ock Lee)

B.S. in Applied Mathematics in Summa Cum Laude   KAIST, South Korea **Feb 2007**

RESEARCH INTEREST

Mathematical Biology Computational Biology	Mathematical Oncology, Cancer dynamics and simulation, Drug resistance, Therapy optimization, Phenotype-structured models
Stochastic Modeling / Stochastic Simulations	Stochastic dynamical system, Kinetic equations, Stochastic/Deterministic multi-scale modeling, Series expansion methods of Random fields, Polynomial Chaos, Probabilistic Collocation
Numerical PDE / Scientific computing	Spectral method, Discontinuous Galerkin method, High-dimensional numerical techniques (Sparse grid and ANOVA approximation, Tensor Decomposition, Reduced Basis method) Domain decomposition, Parallel algorithms

PREPRINT

- E. Kim, R. Schenck, J. West, W. Cross, V. Harris, J. McKenna, H. Cho, E. Coker, S. L-Kramer, K. Tsai, E. Flores, C. D. Gatenbee '*Targeting the Untargetable: Predicting Pramlintide Resistance Using a Neural Network Based Cellular Automata' bioRxiv, https://doi.org/10.1101/211383*
- H. Cho, R. Rockne, '*Mathematical modeling with single-cell sequencing data'* (submitted, https://www.biorxiv.org/content/10.1101/710640v1, 2019)
- H. Cho, D. Levy, '*The Impact of Competition Between Cancer Cells and Healthy Cells on Optimal Drug Delivery*', (submitted, https://arxiv.org/abs/1806.07477, 2018)

JOURNAL PUBLICATIONS

- H. Cho, D. Levy, '*Modeling continuous levels of resistance to multidrug therapy in cancer'*, Appl. Math Model. 64, 2018
- H. Cho, K. Ayers, L. DePillis, Y-H. Kuo, J. Park, A. Radunskaya, R. Rockne, '*Modeling acute myeloid leukemia in a continuum of differentiation states,* Lett. Biomath, 5(sup1), 2018
- H. Cho, H. Elman, '*Adaptive reduced basis collocation method based on PCM for anisotropic stochastic PDEs*', Int. J. Uncertain. Quantif. 8(3), 2018
- H. Cho, D. Levy, '*Modeling the chemotherapy-induced selection of drug-resistant traits during tumor growth'*, J. Theor. Biol. 436(7), 2018
- H. Cho, D. Levy, '*Modeling the dynamics of heterogeneity of solid tumors in response to chemotherapy',* Bull. Math. Bio. 79(12), 2017

- H. Cho, D. Venturi, G. E. Karniadakis, '*Numerical methods for high-dimensional probability density function equations*', J. Comput. Phys. 305, 2016
- H. Cho, X. Yang, D. Venturi, G. E. Karniadakis, '*Algorithms for propagating uncertainty across heterogeneous domains*', SIAM J. Sci. Comput. 37(6), 2015
- H. Cho, D. Venturi, G. E. Karniadakis, '*Statistical Analysis and Simulation of Random Shocks in Burgers Turbulence*', Proc. R. Soc. A, 470(2171), 2014.
- H. Cho, D. Venturi, G. E. Karniadakis, '*Karhunen–Loève expansion for multi-correlated stochastic processes*', Prob. Eng. Mech., 34, 2013.
- H. Cho, D. Venturi, G. E. Karniadakis, '*Adaptive Discontinuous Galerkin Method for Response-Excitation PDF Equations*', SIAM J. Sci. Comput., 35(4), 2013.
- D. Venturi, T. P. Sapsis, H. Cho, G. E. Karniadakis, '*A computable evolution equation for the joint response - excitation probability density function of stochastic dynamical systems*', Proc. R. Soc. A, 468(2139), 2012.

BOOK CHAPTERS

- H. Cho, D. Venturi, G. E. Karniadakis, '*Numerical methods for high-dimensional kinetic equations*', SEMA SIMAI Springer Series, Uncertainty Quantification for Hyperbolic and Kinetic Equations, 2017
- D. Venturi, H. Cho, G. E. Karniadakis, '*Mori-Zwanzig approach to uncertainty quantification*', Springer, Handbook on Uncertainty Quantification, 2016

TEACHING EXPERIENCE

Computational Methods (AMSC460, UMD)	**Spring 2019**
Discrete Mathematics for Life Sciences (MATH135, UMD)	**Fall 2018**
Computational Methods (AMSC460, UMD)	**Spring 2018**
Elementary Calculus I (MATH120, UMD)	**Spring/Fall 2017**
Elementary Calculus I (MATH220, UMD)	**Fall 2016**
Linear Algebra and Differential Equations (Honors) (MATH341, UMD)	**Spring 2015**
Multivariable Calculus (Honors) (MATH340, UMD)	**Fall 2015**
Basic College Mathematics (MATH500, Community College of RI), co-Instructor	**Summer 2014**
Methods of Applied Math: Differential Equation I/II (APMA330/340 Brown Univ.), T. A.	**Fall 2010/Spring 2011**
Analysis I/II (MAS241/242, Korea Advanced Institute of Science and Technology), T. A.	**Spring/Fall 2008**

AWARDS/SCHOLARSHIP

AWM-NSF Travel Grant (Association for Woman in Math-NSF)	**2018**
Landahl Travel Awards (Society for Mathematical Biology)	**2017**
Stella Dafermos Award (Brown University)	**2015**
Academic Excellence Scholarship (KAIST, Department of Applied Mathematics)	**2004-2006**
National Science Scholarship (Korea Science and Engineering Foundation)	**2003-2006**

ACTIVITIES

Co-orrganizer of Research Interaction Team (RIT) on Cancer modeling : Immunotherapy, Fall 2018, UMD
    (with Doron Levy, Jesse Milzman).
Co-organizer of Minisymposium on 'Strategies to overcome resistance to anticancer drugs', SMB 2018
    (with Nara Yoon).

CONFERENCE / INVITED TALKS

- '*Mathematical modeling from single-cell data and its implications in cancer development and drug resistance*', Applied math seminar, (UC Santa Cruz), May 2019
- '*Mathematical model of Hematopoietic cell differentiation from single-cell gene sequencing data*',

- Applied math seminar, (George Mason University), Apr 2019
- Invited talk, University of California, Merced, Feb 2019
- Invited talk, Loyola Marymount University, Jan 2019
- Invited talk, University of California, Riverside, Jan 2019
- Invited talk, The University of British Columbia, Vancouver, Jan 2019
- Invited talk, Arizona State University, Jan 2019
- *'Modeling continuous levels of cell states in cancer development and drug resistance',* JMM2019, Baltimore MD, 2019
- Invited talk, Caltech, Jan 2019
- Invited talk, University of Buffalo, SUNY, Dec 2018
- *'Modeling continuous levels of cell differentiation in acute myeloid leukemia',* SIAM-LS18, MN, 2018
- *'Modeling continuous levels of resistance to combination therapy in cancer',* SMB2018, Sydney, 2018
- *'Modeling continuous levels of resistance to combination therapy in cancer',* Seminar (Division of Math Oncology, Beckman Research Institute), 2018
- *'Numerical methods for uncertainty quantification - from noise parameterization to efficient simulation of parameterized stochastic PDE',* Applied Mathematics Colloquium (UMBC), 2017
- *'High-dimensional stochastic simulation and dimension reduction techniques',* MathSci Seminar (KAIST), 2017
- *'Modeling chemotherapy-induced selection of drug-resistant traits during tumor growth',* Math. Meth. In Bio. Medicine. WPI, 2017
- *'Modeling the dynamics of heterogeneity in response to chemotherapy',* SMB2017, Utah, 2017
- *'Uncertainty propagation across distinct PDF and stochastic spectral systems'*, SIAM-UQ16, EPFL, 2016
- *'High-dimensional Numerical schemes and Dimension Reduction techniques for Uncertainty Quantification based on Probability Density Functions',* Seminar (MECHE, MIT), 2015
- *'Uncertainty quantification based on the response-excitation PDF and reduced order PDF by using Mori-Zwanzig PDF approach'*, SIAM-CSE15, Salt Lake City UT, 2015
- *'High-dimensional response-excitation PDF method: separated representation and ANOVA approximation'*, International Conference on Spectral and High Order Methods (ICOSAHOM), Salt Lake City UT, 2014
- *'Karhunen-Loeve expansion for multi-correlated stochastic processes'*, SIAM-UQ14, GA, 2014
- *'Study of the stochastic inviscid Burgers equation with the joint response-excitation PDF equation'*, 4th International congress on Computational Engineering and Sciences (FEMTEC 2013), NV, 2013
- *'Numerical methods for high-dimensional response-excitation PDF equations'*, 14th International conference on Approximation Theory (AT14), TX, 2013
- *'Spectral/hp element and discontinuous Galerkin methods for response-excitation PDF equations'*, SIAM-CSE13, Boston, MA, 2013.
- *'A new approach to UQ based on the joint excitation-response PDF: Theory and simulation'*, SIAM-UQ12, Raleigh NC, 2012

REFEREE/REVIEWER

• PLOS One • Bioinformatics • Bulletin of Mathematical Biology • SIAM Journal on Scientific Computing • Journal of Computational Physics • Stochastic Partial Differential Equations: Analysis and Computations • Probabilistic Engineering Mechanics • Computer Methods in Applied Mechanics and Engineering