

Youngjoon Hong

Curriculum Vitae

Contact information

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Education

- 2015 **Ph.D. Major in Mathematics**, *Indiana University*.
Thesis advisor: Professor Roger Temam.
- 2015 **Ph.D. Minor in Scientific Computing**, *Indiana University*.
- 2008 **B.S. in Mathematics**, *Korea University*.

Employment history

- 2018 – **Assistant Professor**, *San Diego State University*.
- 2015 – 2018 **Research Assistant Professor**, *University of Illinois at Chicago*.
- 2009 – 2015 **Associate Instructor and Research Assistant**, *Indiana University*.
- 2004 – 2006 **Software programmer**, *Division of research and development, Jaty electronic company*.

Research interests

- Mathematical Deep Learning.
- Applied Mathematics and Computational Science.
- Electromagnetism : Applied Optics and Nanoplasmonics.
- Boundary layer analysis of singularly perturbed problems.
- Geophysical fluid dynamics, Numerical weather prediction.
- Nonlinear dispersive waves.

Publications

- [27] **H.-M Woo, Y. Hong, B. Kwon, and B.-J Yoon**, *Accelerating Optimal Experimental Design for Robust Synchronization of Uncertain Kuramoto Oscillator Model Using Machine Learning*, submitted.
- [26] **A. Bousquet, W. Conrad, O. Sadat, N. Vardanyan, and Y. Hong**, *Deep learning simulation of the SIRD model of COVID-19 with vaccination effects*, submitted.
- [25] **Y. Hong and D. P. Nicholls**, *On the Consistent Choice of Effective Permittivity and Effective Conductivity for Modeling Graphene*, submitted.
- [24] **B. Chudomelka, Y. Hong, H. Kim, J. Morgan, and J. Park**, *Deep neural network for solving differential equations motivated by Legendre-Galerkin approximation*, submitted.
- [23] **Y. Hong, B. Kwon, and B.-J. Yoon**, *Optimal Experimental Design for Uncertain Systems Based on Coupled Differential Equations*, IEEE Access, Accepted.
- [22] **Y. Hong and D. P. Nicholls**, *A rigorous numerical analysis for the transformed field expansion method for diffraction by periodic and layered medium*, SIAM Journal on Numerical Analysis, Accepted.
- [21] **J. Choi, Y. Hong, H. Lee, and C.-Y. Jung**, *Viscosity approximation of the solution to Burgers' equations with shock layers*, Applicable Analysis, Accepted.
- [20] **B. Kim, B. Chudomelka, J. Park, J. Kang, Y. Hong, H. Kim**, *Robust Neural Networks inspired by Strong Stability Preserving Runge-Kutta methods*, European Conference on Computer Vision, Accepted.
- [19] **M. Chekroun, Y. Hong, and R. Temam**, *Enriched numerical scheme for singularly perturbed Quasi-Geostrophic equations*, Journal of Computational Physics, Vol.416, 2020.
- [18] **A. Bousquet, Y. Hong, R. Temam, and J. Tribbia**, *Numerical simulations of the two-dimensional inviscid hydrostatic primitive equations with humidity and saturation*, Journal of Scientific Computing, Vol. 83, 2020.
- [17] **Y. Hong, M. Otten, M. Min, S. Gray, and D. Nicholls**, *Periodic corrugations to increase efficiency of thermophotovoltaic emitting structures*, Applied Physics Letters, Vol. 114, 2019.
- [16] **J. Bona, H. Chen, Y. Hong, and O. Karakashian**, *Numerical Study of the Second-Order Correct Hamiltonian Model for Unidirectional Water Waves*, Water Waves, Vol. 1, 3-40, 2019.
- [15] **Y. Hong and D. P. Nicholls**, *A High-Order Perturbation of Surfaces Method for Vector Electromagnetic Scattering by Doubly Layered Periodic Crossed Gratings*, Journal of Computational Physics, Vol. 372, 748-772, 2018.
- [14] **Y. Hong, C.-Y. Jung, and R. Temam**, *Boundary layer analysis for the stochastic nonlinear reaction-diffusion equations*, Physica D, Vol. 376-377, no. 1, pp. 247-258, 2018.
- [13] **Y. Hong and C.-Y. Jung**, *Enriched spectral method for stiff convection-dominated equations*, Journal of Scientific Computing, Vol. 74, no. 3, pp 1325-1346, 2018.

- [12] **Y. Hong and D. P. Nicholls**, *A high-order perturbation of surfaces method for scattering of linear waves by periodic multiply layered gratings in two and three dimensions*, *Journal of Computational Physics*, Vol. 345, no. 15, pp. 162-188, 2017.
- [11] **Y. Hong and D. P. Nicholls**, *A stable high-order perturbation of surfaces method for numerical simulation of diffraction problems in triply layered media*, *Journal of Computational Physics*, Vol. 330, no. 1, pp. 1043-1068, 2017.
- [10] **D. Bouche, Y. Hong, and C.-Y. Jung**, *Asymptotic analysis of the scattering problem for the Helmholtz equations with high wave numbers*, *Discrete and Continuous Dynamical Systems - Series A*, Vol. 37, no. 3, pp. 1159-1181, 2017.
- [9] **Y. Hong**, *Global attractor of atmospheric equations*, *Asymptotic Analysis*, vol. 96, no. 2, pp. 91-107, 2016.
- [8] **A. Bousquet, M. Chekroun, Y. Hong, R. Temam, and J. Tribbia**, *Numerical simulations of the humid atmosphere above a mountain*, *Mathematics of Climate and Weather Forecasting*, vol. 1, no.1, 96-126, 2015.
- [7] **Y. Hong and D. Wirosoetisno**, *Timestepping schemes for the 3d Navier-Stokes equations*, *Applied Numerical Mathematics*, Vol. 96 (2015), 153-164.
- [6] **Y. Hong, C.-Y. Jung, and R. Temam**, *Singular perturbation analysis of time dependent convection-diffusion equations in a circle*, *Nonlinear Analysis: Theory, Methods & Applications*, Vol. 119 (2015), 127-148.
- [5] **Y. Hong**, *Numerical approximation of the singularly perturbed heat equation in a circle*, *Journal of Scientific Computing*, Vol. 62 (2015), no. 1, 1-24.
- [4] **A. Bousquet, G.-M. Gie, Y. Hong, and J. Laminie**, *A higher order finite volume resolution method for a system related to the inviscid primitive equations in a complex domain*, *Numerische Mathematik*, Vol. 128 (2014), no. 3, 431-461.
- [3] **Y. Hong, C.-Y. Jung, and R. Temam**, *On the numerical approximations of stiff convection-diffusion equations in a circle*, *Numerische Mathematik*, Vol. 127 (2014), no. 2, 291-313.
- [2] **Y. Hong, C.-Y. Jung, and J. Laminie**, *Singularly perturbed reaction-diffusion equations in a circle with numerical applications*, *International Journal of Computer Mathematics*, Vol. 90 (2013), no. 11, 2308-2325.
- [1] **Q. Chen, Y. Hong, and R. Temam**, *Analysis of a penalty method*, *Journal of Scientific Computing*, Vol. 53 (2012), no. 1, 3-34.

Funding

- 2020-2025 **Simons Foundation: Collaboration Grants for Mathematicians.**
- 2019-2020 **UGP Grant.**
- 2015 - 2017 **AMS-Simons Travel Grant.**
- 2014 - 2017 **IMA Travel Grant.**
- Summer 2016 **SIAM Early Career Travel Award.**
- Summer 2015 **SIAM Student Travel Award.**
- Fall 2014 **NSF Graduate Student Fellowship, Sponsor: Professor Roger Temam.**

- Summer in 2011 - 2015 **NSF Research Assistant**, *Sponsor: Professor Roger Temam.*
- Spring 2014 **Glenn Schober Memorial Travel Award**, *Indiana University.*
- Fall 2014 **AMS Travel Grant.**
- Fall 2013 **AMS Travel Grant.**
- 2007 - 2009 **Scholarship**, *Korea University.*

Organizing activities

- Dec. 2019 **Organizer**, *Mini-Symposium on Recent Developments on Analysis and Computations in Fluid Dynamics*, SIAM Conference on Analysis of Partial Differential Equation, Palm Springs, CA.
- Feb. 2019 **Organizer**, *Mini-Symposium on Recent Development of Numerical Methods for Optics and Plasmonics*, SIAM Conference on Computational Science and Engineering, Spokane, WA.
- Dec. 2017 **Organizer**, *Mini-Symposium on Recent Development in Numerical Methods for Optics and Plasmonics*, SIAM Conference on Analysis of Partial Differential Equations, Baltimore, MD.
- Dec. 2017 **Organizer**, *Mini-Symposium on Recent Developments in Fluid Dynamics - Theory and Numerical Approximation*, SIAM Conference on Analysis of Partial Differential Equations, Baltimore, MD.
- Sep. 2017 **Organizer**, *The 79/80th Anniversary Midwest PDE Seminar*, Chicago, IL.
- Mar. 2017 **Organizer**, *Mini-Symposium on Numerical Simulation of Optical and Plasmonic Phenomena*, SIAM Conference on Computational Science and Engineering, Atlanta, GA.
- Jul. 2016 **Organizer**, *Mini-Symposium on Numerical Methods for Plasmonics and Optics*, SIAM Annual Meeting, Boston, MA.
- Jul. 2016 **Organizer**, *Special Session on Classical and Geophysical Fluid Dynamics*, The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Orlando, FL.
- Dec. 2015 **Organizer**, *Mini-Symposium on Singular Perturbations and Boundary Layer - Theory and Numerical Aspects*, SIAM Conference on Analysis of Partial Differential Equation, Scottsdale, AZ.

Selected invited talks

- Sep. 2020 **Colloquium**, *Department of Mathematical Sciences*, Ulsan National Institute of Science and Technology, Ulsan, Korea.
- Apr. 2020 **Applied Math Seminar**, *Department of Mathematics*, University of California, Riverside, Riverside, CA.
- Oct. 2019 **Mini-Symposium on Recent Progress in Fluid Mechanics**, *SIAM Conference on Analysis of Partial Differential Equation*, Palm Springs, CA.
- Apr. 2018 **Plenary speaker**, *Chicago Area SIAM Student Conference*, IIT, Chicago, IL.

- Mar. 2018 **Colloquium**, *Department of Mathematics*, University of Memphis, Memphis, TN.
- Sep. 2017 **79/80th Midwest PDE Seminar**, *Department of Mathematics*, UIC, Chicago, IL.
- Jun. 2017 **Conference on Classical and Geophysical Fluid Dynamics**, *Department of Mathematics*, Virginia Tech, Blacksburg, VA.
- Oct. 2016 **Complex Fluid Seminar**, *Department of Mathematics*, Pennsylvania State University, State College, PA.
- Oct. 2016 **Mini-Symposium on Nonlinear Analysis**, *SIAM Central States Section Conference*, Little Rock, AR.
- Jun. 2016 **Seminar on Hybrid numerical methods for physical problems in layered media**, *Lawrence Berkeley National Laboratory*, UC Berkeley, Berkeley, CA.
- Jul. 2016 **Mini-Symposium on Numerical methods for plasmonics and optics**, *SIAM Annual Meeting*, Boston, MA.
- Jul. 2016 **Special Session on Emergence and Dynamics of Patterns in Nonlinear Partial Differential Equation**, *The 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Orlando, FL.
- Dec. 2015 **Mini-Symposium on Recent Advances in Theoretical and Numerical Aero and Hydrodynamics**, *SIAM Conference on Analysis of Partial Differential Equation*, Scottsdale, AZ.
- Oct. 2015 **Special Session on Analysis of Partial Differential Equations and Fluid Dynamics**, *AMS Central Fall Sectional Meeting*, Loyola University Chicago, Chicago, IL.
- Jun. 2015 **Mini-Symposium on Modeling and Simulation of Multiscale and Coupled Processes in Atmospheric Physics**, *SIAM Conference on Mathematical and Computational Issues in the Geosciences*, Stanford University, CA.
- Jan. 2015 **Colloquium**, *Department of Mathematics*, University of North Carolina, Charlotte, NC.
- Dec. 2014 **Applied Mathematics Seminar**, *Department of Mathematics*, Michigan State University, East Lansing, MI.
- Nov. 2014 **Special Session on Recent Advances in Numerical Methods for Fluid Flow Problems**, *AMS Fall Southeastern Sectional Meeting*, University of North Carolina, Greensboro, NC.
- Oct. 2014 **Finite Element Circus**, *IMA Special Workshop*, Institute for Mathematics and its Applications, Minneapolis, MN.
- Jul. 2014 **Mini-Symposium on Advances in the analysis and computation of fluid problem**, *SIAM annual meeting*, Chicago, IL.
- Nov. 2013 **Special Session on Fluids and Boundaries**, *AMS Western Sectional Meeting*, University of California, Riverside, CA.
- Oct. 2013 **Special Session on Partial Differential Equations from Fluid Mechanics**, *AMS Southeastern Sectional Meeting*, University of Louisville, Louisville, KY.

Academic Visiting

- Aug. 2019 **University of Illinois, Chicago**, *Host - Professor Jerry Bona*, Chicago, IL.
- May. 2019 **UNIST**, *Host - Professor Chang-Yeol Jung*, Ulsan, South Korea.
- Sep. 2018 **University of Illinois, Chicago**, *Host - Professor Jerry Bona*, Chicago, IL.
- May. 2018 **University of Tennessee**, *Host - Professor Jerry Bona and Ohannes Karakashian*, Knoxville, TN.
- May. 2017 **University of Tennessee**, *Host - Professor Jerry Bona and Ohannes Karakashian*, Knoxville, TN.
- Feb. 2017 **Indiana University**, *Host - Professor Roger Temam*, Bloomington, IN.
- Oct. 2016 **Pennsylvania State University**, *Host - Professor Chun Liu*, State College, PA.
- May. 2016 **UNIST**, *Host - Professor Chang-Yeol Jung*, Ulsan, South Korea.
- Apr. 2016 **Indiana University**, *Host - Professor Roger Temam*, Bloomington, IN.
- Oct. 2015 **Indiana University**, *Host - Professor Roger Temam*, Bloomington, IN.
- May. 2015 **UNIST**, *Host - Professor Chang-Yeol Jung*, Ulsan, South Korea.

Teaching experience

- Spring 2020 **Finite Element Method, Math 596**, *San Diego State University*.
- Spring 2020 **Intro to Math Modeling, Math 336**, *San Diego State University*.
- Fall 2019 **Advanced Calculus I, Math 330**, *San Diego State University*.
- Spring 2019 **Advanced Computational PDE, Math 693B**, *San Diego State University*.
- Spring 2019 **Scientific Computing, COMP/CS 605**, *San Diego State University*.
- Fall 2018 **Calculus II, Math 151**, *San Diego State University*.
- Spring 2018 **Applied Partial Differential Equations, Math 481**, *University of Illinois at Chicago*.
- Fall 2017 **Calculus III, Math 210**, *University of Illinois at Chicago*.
- Spring 2017 **Applied Partial Differential Equations, Math 481**, *University of Illinois at Chicago*.
- Fall 2016 **Applied Differential Equations, Math 480**, *University of Illinois at Chicago*.
- Fall 2016 **Calculus III, Math 210**, *University of Illinois at Chicago*.
- Spring 2016 **Applied Partial Differential Equations, Math 481**, *University of Illinois at Chicago*.
- Fall 2015 **Calculus III, Math 210**, *University of Illinois at Chicago*.
- Spring 2015 **Introduction to Finite Math II, Math-D117**, *Indiana University*.
- Spring 2014 **Introduction to Finite Math II, Math-D117**, *Indiana University*.
- Fall 2013 **Finite Math, Math-M118**, *Indiana University*.
- Spring 2013 **Finite Math, Math-M118**, *Indiana University*.
- Fall 2012 **Finite Math, Math-M118**, *Indiana University*.
- Summer 2012 **Finite Math, Math-M118**, *Indiana University*.
- Spring 2012 **Precalculus, Math-M025**, *Indiana University*.

Fall 2011 **Precalculus, Math-M025**, *Indiana University*.

Service and miscellaneous

1. Co-organizer of Analysis and Applied Mathematics Seminar, University of Illinois at Chicago, 2016–2018.
2. Preliminary qualifying exam committee on Differential equations/Applied differential equations, University of Illinois at Chicago, 2016–2018.
3. Organizer of SDSU Math Colloquium/Distinguished Lecture Series, 2019–present.
4. **Referee:** Journal of Differential Equations, Journal of Computational Physics, Numerische Mathematik, Applied Numerical Mathematics, Discrete and Continuous Dynamical Systems, Advances in Computational Mathematics, Applicable Analysis, International Journal of Computer Mathematics, Asymptotic Analysis