

Youngjoon Hong

Curriculum Vitae

Contact information

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Education

2009–2015 **Ph.D. Major in Mathematics**, *Indiana University*.
Thesis advisor: Professor Roger Temam.

2009–2015 **Ph.D. Minor in Scientific Computing**, *Indiana University*.

2008 **B.S. in Mathematics**, *Korea University*.

Employment history

2015 – 2018 **Research Assistant Professor**, *University of Illinois at Chicago*.
Mentor: Professor Jerry Bona and Professor David Nicholls.

2009 – 2015 **Associate Instructor and Research Assistant**, *Indiana University*.

2004 – 2006 **Software programmer**, *Division of research and development*, Jaty electronic company.

Research interests

- Boundary layer analysis of singularly perturbed problems.
- Geophysical fluid dynamics : primitive equations and shallow water equations.
- Electromagnetism : applied optics and plasmonics.
- Numerical methods for PDEs: finite element methods, finite volume methods, and spectral methods.
- Long time stability of numerical schemes.
- Nonlinear dispersive waves.

Publications

- [16] **J. Bona, H. Chen, Y. Hong, and O. Karakashian**, *Numerical study of the second order Hamiltonian model for unidirectional water waves*, preprint.
- [15] **J. Bona and Y. Hong**, *Numerical study of the generalized Korteweg-de Vries equations with oscillating nonlinearity and boundary conditions*, preprint.
- [14] **Y. Hong, C.-Y. Jung, and R. Temam**, *Boundary layer analysis for the stochastic nonlinear reaction-diffusion equations*, *Physica D*, to appear.
- [13] **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*, to appear.
- [12] **Y. Hong and C.-Y. Jung**, *Enriched spectral method for stiff convection-dominated equations*, *Journal of Scientific Computing*, to appear.
- [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.

Awards

- 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

- 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

- June. 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.
June. 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.
- June. 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 **Mini-Symposium on Fluid Dynamic Equations : Existence and Asymptotic Between Theory and Numerics**, *SIAM Conference on Analysis of Partial Differential Equation*, Orlando, FL.
- 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

- 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.
- April. 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 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*.

Computing skills

Programming skills

Fortran 95/2003, Python (numpy, scipy, matplotlib), C/C++, Matlab, Maple, Mathematica, MPI.

Experience

1. Developed or co-developed 2D limited area geophysical fluid dynamical models using upwind finite volume schemes.
2. Developed enriched finite element and spectral methods for singularly perturbed models.
3. Developed electromagnetic scattering models from a multi-layered periodic structure using Spectral methods.
4. Developed dispersive nonlinear models (IVP and BVP) using Spectral methods.

Service and miscellaneous

1. Co-organizer of Analysis and Applied Mathematics Seminar, University of Illinois at Chicago, 2016–present.
2. Preliminary qualifying exam committee on Differential equations/Applied differential equations, University of Illinois at Chicago, 2016–present.
3. **Referee:** Journal of Differential Equations, Numerische Mathematik, Discrete and Continuous Dynamical Systems, Advances in Computational Mathematics, Applicable Analysis, International Journal of Computer Mathematics.

References

Professor Jerry Bona (Post-doc mentor)

Department of Mathematics, Statistics, and Computer Science
University of Illinois at Chicago

Email: bona@math.uic.edu

Professor Michael Jolly

Department of Mathematics

Indiana University

Email: msjolly@indiana.edu

Professor David Nicholls (Post-doc mentor)

Department of Mathematics, Statistics, and Computer Science

University of Illinois at Chicago

Email: davidn@uic.edu

Professor Jie Shen

Center for Computational and Applied Mathematics, Director

Purdue University

Email: shen7@purdue.edu

Professor Roger Temam (Ph.D. advisor)

Institute of Scientific Computing and Applied Mathematics, Director

Indiana University

Email: temam@indiana.edu

Professor Shouhong Wang

Department of Mathematics

Indiana University

Email: showang@indiana.edu

Professor Christof Sparber (Teaching supervisor)

Department of Mathematics, Statistics, and Computer Science

University of Illinois at Chicago

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