Shinhoo Kang

CONTACT

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Education

2014–2019/8 **Ph.D. in Engineering Mechanics**.
Department of Aerospace and Engineering Mechanics
The University of Texas at Austin, TX
Advisor: Tan Bui-Thanh

2007–2009 **M.Eng. in Spatial Design and Engineering**.
Handong Global University, Korea
Title: The yellow sand effect on radiowave propagation
Advisor: Cheo K. Lee

1999–2007 **B.Eng. in Computer Science and Electrical Engineering**.
Handong Global University, Korea

Research Interests

- Numerical methods: (Hybridized) Discontinuous Galerkin method, Arbitrary Lagrangian-Eulerian (ALE), Adaptive Mesh-Refinement (AMR), IMplicit-EXplicit (IMEX) method, Exponential Time integrators
- Computational mechanics: computational fluid dynamics (CFD), geophysical flows (atmospheric flows, mantle convection)
- High-Performance Computing (HPC)
- Remote sensing

Experience

2019.9– present **Postdoctoral Appointee**, *Argonne National Laboratory*, Lemont, IL.
CANGA project: develop stable coupling methods for multi-physics problem
- IMEX coupling methods for atmospheric and ocean interaction

2018.8 **Attending Workshop**, *Advances in PDEs: Theory, Computation and Application to CFD*, Providence,RI.

2017.8 **Attending Workshop**, *Argonne Training Program on Extreme-Scale Computing.*, Chicago.

2014–2019.8 **Research Assistant**, *The University of Texas*, Austin.

- Develop computational atmospheric modeling in hybridized discontinuous Galerkin (HDG) discretization: implicit-explicit (IMEX) time integrator, spherical advection modeling, and spherical shallow water modeling.
- Develop degenerate elliptic equation model with HDG methods
- Develop exponential time integrator in the DG discretizations
- Develop sliding-mesh interfaces in the (hybridized) DG discretizations

2012–2014 **Research Scientist** , *Korea Institute of Atmospheric Prediction Systems*, Korea.
Develope and test dynamical core of atmospheric models

- Parallelize spherical shallow water model/ two-dimensional non-hydrostatic model with MPI in element-based Galerkin (EBG) discretization
- Evaluate the shallow water model with ideal test cases
- Develop horizontally explicit vertically implcit (HEVI) time integrator on two-dimensional non-hydrostatic model
- Compare spurious wave reflection response with staggered finite-volume and unstaggered EBG scheme under mesh-refinement
- Examine one-way and two-way grid nesting in EBG discretization

2010–2011 **Research Scientist** , *National Institute of Meteorological Research*, Seoul, Korea.
Retrieval on remote sensing data and validate the products

- Improve and validate temperature and moisture retrieval algorithm from ground based hyperspectral instruments: calculating bias spectrum and obtaining new regression coefficients by using principal component regression (PCR) method

Computer skills

Languages JULIA, FORTRAN, C, C++, MATLAB, PYTHON, BASH, NCL

Tools Paraview

Publications

Journal Papers

Kang, Shinhoo and Tan Bui-Thanh, "A Scalable exponential-DG approach for nonlinear conservation laws: with application to Burger and Euler equations.", *sumitted*, 2020

Kang, Shinhoo, Tan Bui-Thanh, Todd Arbogast, "A Hybridized Discontinuous Galerkin Method for A Linear Degenerate Elliptic Equation Arising from Two-Phase Mixtures.", *Computer Methods in Applied Mechanics and Engineering*, 350, pp. 315-336, 2019

Kang, Shinhoo, Francis X. Giraldo, Tan Bui-Thanh, "IMEX HDG-DG: a coupled implicit hybridized discontinuous Galerkin (HDG) and explicit discontinuous Galerkin (DG) approach for shallow water systems.", *Journal of Computational Physics*, Oct. 2019

Kang, Shin-Hoo, Tae-Young Goo, and Mi-Lim Ou., "Improvement of AERI T/q Retrievals and Their Validation at Anmyeon-Do, South Korea.", *Journal of Atmospheric and Oceanic Technology*, 30(7), pp. 1433-1446, 2013

Conference Papers

Lee, Joon-Yong, Yung-Hoon Jo, **Shin-Hoo Kang**, A-Young Kang, Dong-Heon Ha, and Sung-Jun Yoon., "Determination of the existence of LOS blockage and its application to UWB localization.", *Military Communications Conference, 2006*, IEEE, 2006

Jo, Yung-Hoon, Joon-Yong Lee, Dong-Heon Ha, and **Shin-Hoo Kang**., "Accuracy enhancement for UWB indoor positioning using ray tracing.", *The Journal of Korean Institute of Communications and Information Sciences*, 31(10C), pp. 921-926, 2006

Presentations

Oral Presentations

Kang, Shinhoo and Tan Bui-Thanh, "A Scalable exponential-DG approach for nonlinear conservation laws: with application to Burger and Euler equations", Modeling and Simulation of Transport Phenomena, Moselle, Germany, October 14, 2020

Kang, Shinhoo, Francis X. Giraldo, and Tan Bui-Thanh, "IMEX HDG-DG: a coupled implicit hybridized discontinuous Galerkin and explicit discontinuous Galerkin approach for shallow water systems", North American High-Order Methods Conference, San Diego, CA, USA, June 3, 2019

Kang, Shinhoo, Tan Bui-Thanh and David A. Kopriva, "Discrete Stable, Conservative, and Constant-preserving HDG methods for Hyperbolic Equations on Nonconforming Curved Meshes", Finite Element in Fluid Conference, Chicago, Ilinois, USA, Apr. 3, 2019

Kang, Shinhoo and Tan Bui-Thanh, "Toward wind turbine simulation with high-order hybridized discontinuous Galerkin method: IMEX HDG-DG and sliding mesh", SIAM Conference on Computational Science and Engineering, Spokane, Washington, USA, Feb. 27, 2019

Kang, Shinhoo, Sriramkrishnan Muralikrishnan and Tan Bui-Thanh, "IMEX HDG-DG: A coupled implicit hybridized discontinuous Galerkin and explicit discontinuous Galerkin approach for Euler systems", Texas Applied Mathematics and Engineering Symposium, Austin, TX, USA, Sep. 21, 2017

Kang, Shinhoo, Sriramkrishnan Muralikrishnan, Stephen Shannon and Tan Bui-Thanh, "Some advances in the upwind hybridized discontinuous Galerkin method for dynamical cores", The workshop on Partial Differential Equations on the Sphere, Paris, France, Apr. 4, 2017

Kang, Shinhoo, Francis X. Giraldo, and Tan Bui-Thanh, "IMEX-HDG-DG Schemes for Shallow Water Equation", FE RODEO, TAMU, CS, TX, March 4-5, 2016

Kang, Shinhoo, Francis X. Giraldo, and Tan Bui-Thanh, "IMEX-HDG-DG Schemes for Shallow Water Equation", PDE on the sphere, Seoul, Korea, October 27-28, 2015

Kang, Shinhoo, Tan Bui-Thanh, and Francis X. Giraldo, "IMEX-HDG-DG Schemes for Nonlinear Partial Diferential Equations", FEM RODEO, SMU, Dallas, TX, February 27-28, 2015

Poster Presentations

Kang, Shinhoo, and Tan Bui-Thanh, "A Hybridized Discontinuous Galerkin method for Geophysical Flows", Advances in PDEs: Theory, Computation and Application to CFD, Providence, RI, USA, Aug. 21, 2018

Kang, Shinhoo, Sriramkrishnan Muralikrishnan, Stephen Shannon, and Tan Bui-Thanh, "An Upwind Hybridized Discontinuous Galerkin Framework", Advances in Mathematics of Finite Elements, Austin, TX, USA, March 22, 2016

Kang, Shin-Hoo, Ki-Hwan Kim, Suk-Jin Choi, Jung-Han Kim, Sun-Hee Yun, and Tae-Jin Oh, "Parallelization of KIAPS-SWE based on Continuous and Discontinuous Galerkin Methods", in proc. the Fall Meeting of KMS, Gwangju, Korea., 2013

Kang, Shin-Hoo and Tae-jin Oh, "Comparison Study of Spurious Wave Reflection Response with Staggered Finite-Volume and Unstaggered Element-Based Galerkin Schemes under Mesh-Refinement", SIAM Conference on the Mathematical and Computational Issues, Padova, Italy, 2013

Kang, Shin-Hoo, Tae-Jin Oh, Suk-Jin Choi and Tae-Hyeong Yi, "Examining One-way and Two-way Grid Nesting in Continuous/ Discontinuous Galerkin discretization", in proc. The Fall Metting of AGU, San Francisco, CA, USA, 2012

References

Dr. Emil M. Constantinescu, Mathematics and Computer Science Division, Argonne National Laboratory, Lemont, IL, USA, emconsta@anl.gov

Prof. Tan Bui-Thanh, Dep. of Aerospace Engineering and Engineering Mechanics, The university of Texas at Austin, WRW308C, Austin, TX, USA, tanbui@oden.utexas.edu

Prof. Francis X. Giraldo, Dep. of Applied Mathematics, Naval Postgraduate School, Monterey, CA 93940, USA, fxgirald@nps.edu

Prof. Cheo K. Lee, Dep. of Spatial Environmental System Engineering, Handong Global University, Newton Hall 208, Pohang, Korea, cklee@handong.edu