Donsub Rim

CONTACT INFORMATION

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RESEARCH INTERESTS

Numerical analysis of partial differential equations (PDEs) and inverse problems

- Model reduction of parametrized nonlinear hyperbolic systems of conservation laws
- Uncertainty quantification (UQ) and inverse problems involving nonlinear hyperbolic PDEs
- Discrete Radon transform (DRT) and its applications
- Applications in geophysics and medical imaging: probabilistic tsunami hazard assessment, storm surge prediction, ultrasound modulated electrical impedance tomography (UMEIT)

EMPLOYMENT

Columbia University, New York, NY, USA

C.K. Chu Assistant Professor July 2017 - June 2019

EDUCATION

University of Washington, Seattle, WA, USA

Ph.D. in Applied Mathematics June 2017

Uncertainty quantification problems in tsunami modeling and reduced-order models for hyperbolic partial differential equations.

Advisors: Randall J. LeVeque and Gunther Uhlmann.

Yonsei University, Seoul, South Korea

M.Sc in Applied Mathematics August 2012

The inf-sup stability of a hybrid Discontinuous Galerkin method (HDG).

Advisors: Carsten Carstensen and Eun-Jae Park

B.Sc. in Mathematics, B.B.A. in Business Administration February 2011

JOURNAL PUBLICATIONS

1. F. Monard, D. Rim,
Imaging of isotropic and anisotropic conductivities from power densities in three dimensions,
Inverse Probl., (2018) **34** (7), 075005. [arXiv:1712.04028]

2. D. Rim, S. Moe, and R. J. LeVeque,
Transport reversal for model reduction of hyperbolic partial differential equations,
SIAM/ASA J. Uncertainty Quantification, (2018) ***6*** *(1), 118-150.* [arXiv:1701.07529]

3. D. Rim,
An elementary proof that symplectic matrices have determinant one,
Adv. Dyn. Syst. Appl. (2017) **12** (1) 15-20. [arXiv:1505.04240]

4. R. J. LeVeque, K. Waagan, F. I. González, D. Rim, and G. Lin,
Generating random earthquake events for probabilistic tsunami hazard assessment (PTHA),
Pure Appl. Geophys. (2016), pp. 1-22. [arXiv:1605.02863]

5. C. Carstensen, J. Gedicke and D. Rim,
Explicit error estimates for Courant, Crouzeix-Raviart and Raviart-Thomas FEMs,
J. Comput. Math. **30** (2012), pp. 337-353. [urn:nbn:de:0296-matheon-9314]

PREPRINTS

1. D. Rim, K.T. Mandli,
   Model reduction of a parametrized scalar hyperbolic conservation law using displacement interpolation,
   submitted, SIAM J. Sci. Comput. [arXiv:1805.05938]
2. D. Rim, K.T. Mandli,
   Displacement interpolation using monotone rearrangement,
   under review, SIAM/ASA J. Uncertainty Quantification. [arXiv:1712.04028]
3. D. Rim,
   Dimensional splitting of hyperbolic PDEs using the Radon transform,
   under review, SIAM J. Sci. Comput. [arXiv:1705.03609]

CONFERENCES

1. SIAM Annual Meeting, Portland, OR, July 2018
   Dimensionality reduction of wave-like phenomena using monotone rearrangement (Minisymposium)
   Dimensional splitting using the Radon transform (Minisymposium)
2. European Conference on Mathematics for Industry (ECMI), Budapest, Hungary, June 2018
   Model reduction of Burgers' equation using displacement interpolation (Minisymposium)
3. SIAM Mathematics of Planet Earth, Philadelphia, PA, September 2016
   Performing and communicating probabilistic tsunami hazard assessment (Minisymposium)
4. WIAS Uncertainty Quantification Summer School, Berlin, Germany, July 2016
5. CLAWPACK Development Workshop, Seattle, WA, August 2016
6. SIAM Gene Golub Summer School 2016, Philadelphia, PA, July 2016
7. CSDMS Annual Meeting, Boulder, CO, May 2016
   Bayesian inversion for tsunami sources using DART buoy measurements (Poster)
8. Pacific Northwest Numerical Analysis Seminar, Bellingham, WA, October 2015
   Inverse diffusion from power densities in dimension three (Poster)
9. SIAM Computational Science and Engineering, Salt Lake City, UT, March 2015
10. CLAWPACK Development Workshop, Salt Lake City, UT, March 2015
11. Pacific Northwest Numerical Analysis Seminar, Portland, OR, October 2014
12. Computational Methods in Applied Mathematics, Berlin, Germany, August 2012
13. KSIAM 2012 Spring Conference, Seoul, South Korea, May 2012
    The inf-sup test for a hybrid DG method (Poster, Best poster award)

SEMINAR TALKS

1. Applied Math Seminar, Applied Math Dept, U of Washington, July 2018
   Model reduction of Burgers' equation
2. Applied Mathematics Colloquium, APAM, Columbia U, February 2017
   Toward reduced order models for hyperbolic partial differential equations
3. Numerical Analysis Research Club (NARC), UW Applied Math
   - *Hierarchical tensor decompositions* October 2016
   - *Discrete Radon Transform and its exact inverse* April 2016
   - *Active subspaces* October 2015
   - *An efficient Neumann series algorithm for PAT/TAT with variable sound speed* April 2014
   - *A brief review of a posteriori error estimators for FEMs* October 2013

4. Seniors Seminar, PLU Math
   Numerical modeling of tsunamis and its applications October 2016

5. Inverse Problems Seminar, UW Math
   Approximate Riemann solvers for nonlinear hyperbolic PDEs November 2014

REFEREE SERVICE

Journal of Linear Algebra and Its Applications

TEACHING

Columbia University, New York, USA

Instructor

- APMA E4200: Partial Differential Equations Fall 2018
- APMA E3201: Applied Mathematics II: PDEs Spring 2018
- APMA E4200: Partial Differential Equations Fall 2017

University of Washington, Seattle, USA

Teaching Assistant

- AMATH 301: Beginning Scientific Computing Fall 2013,Winter 2014
- AMATH 577: Financial Software Development and Integration with C++ Spring 2013
- AMATH 383: Introduction to Mathematical Modelling Winter 2013
- MATH 125: Calculus and Analytic Geometry II Autumn 2012

OTHER EXPERIENCES

University of Washington, Seattle, USA

Systems Administrator Spring 2014 - June 2017

Provided comprehensive IT service for the Applied Mathematics department at UW.

- Successfully proposed and procured 2x20-core machine with 512GB RAM and high performance GPUs for the department through Student Technology Fee (STF).
- Maintained departmental computing resources: developed Python scripts for real-time monitoring of department computing cluster and printers.
- Maintained wordpress website for the department.

TREUM Co., Seoul, South Korea April 2011 – August 2012

Researcher (part-time)

Morgan Stanley, Seoul, South Korea October – December 2009

Intern, Investment Banking Division

District Office of Education, South Korea July 2006 – September 2008

Civil Servant, Mandatory Civil Service

COMPUTER SKILLS

Python, Fortran, C, MATLAB, C++, knowledgeable in Linux environment.

LANGUAGES

Bilingual in Korean and English. Beginner in Spanish.

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