

Donsub Rim

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Applied Physics and Applied Mathematics, E-mail: dr2965@columbia.edu
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RESEARCH INTERESTS **Numerical analysis of partial differential equations (PDEs) and inverse problems**

- Uncertainty quantification (UQ) problems involving nonlinear hyperbolic PDEs.
- Reduced order models (ROMs) of parametrized hyperbolic PDEs.
- Discrete Radon transform (DRT) and its applications
- Probabilistic tsunami hazard assessment (PTHA)
- Inverse conductivity problem with power densities in dimension three.

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 A. 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

PROFESSIONAL EXPERIENCE **Columbia University**, New York, NY, USA

C.K. Chu Assistant Professor July 2017 - present

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,
preprint. [arXiv:1805.05938]
 2. D. Rim, K.T. Mandli,
Displacement interpolation using monotone rearrangement,
preprint. [arXiv:1712.04028]
 3. D. Rim,
Dimensional splitting of hyperbolic PDEs using the Radon transform,
preprint. [arXiv:1705.03609]
- CONFERENCES
1. SIAM Annual Meeting, Portland, OR, July 2018
Dimensionality reduction using monotone rearrangement (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 Mathematics Colloquium, APAM, Columbia U, February 2017
Toward reduced order models for hyperbolic partial differential equations
 2. 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
 3. Seniors Seminar, PLU Math
Numerical modeling of tsunamis and its applications October 2016
 4. Inverse Problems Seminar, UW Math
Approximate Riemann solvers for nonlinear hyperbolic PDEs November 2014

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| REFeree SERVICE | Journal of Linear Algebra and Its Applications | | | | |
| TEACHING | <p>Columbia University, New York, USA</p> <p><i>Instructor</i></p> <ul style="list-style-type: none"> ◦ APMA E3201: Applied Mathematics II: PDEs Spring 2018 ◦ APMA E4200: Partial Differential Equations Fall 2017 <p>University of Washington, Seattle, USA</p> <p><i>Teaching Assistant</i></p> <ul style="list-style-type: none"> ◦ 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 | <p>University of Washington, Seattle, USA</p> <p><i>Systems Administrator</i> Spring 2014 - June 2017</p> <p>Provided comprehensive IT service for the Applied Mathematics department at UW.</p> <ul style="list-style-type: none"> ◦ 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. <p>TREUM Co., Seoul, South Korea April 2011 – August 2012</p> <p><i>Researcher (part-time)</i></p> <p>Morgan Stanley, Seoul, South Korea October – December 2009</p> <p><i>Intern, Investment Banking Division</i></p> <p>District Office of Education, South Korea July 2006 – September 2008</p> <p><i>Civil Servant, Mandatory Civil Service</i></p> | | | | |
| COMPUTER SKILLS | Python, MATLAB, Fortran, C, C++, knowledgeable in Linux environment. | | | | |
| LANGUAGES | Bilingual in Korean and English. Beginner in Spanish. | | | | |
| REFERENCES | <table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top; width: 50%;"> <p>Randall J. LeVeque Department of Applied Mathematics University of Washington Seattle, WA, USA E-mail: rjl@uw.edu</p> </td> <td style="vertical-align: top; width: 50%;"> <p>Gunther Uhlmann Department of Mathematics University of Washington Seattle, WA, USA E-mail: gunther@math.washington.edu</p> </td> </tr> <tr> <td style="vertical-align: top;"> <p>Kyle T. Mandli Department of Applied Physics & Applied Mathematics Columbia University New York, NY, USA E-mail: kyle.mandli@columbia.edu</p> </td> <td style="vertical-align: top;"> <p>François Monard Department of Mathematics University of California Santa Cruz, CA, USA E-mail: fmonard@ucsc.edu</p> </td> </tr> </table> | <p>Randall J. LeVeque Department of Applied Mathematics University of Washington Seattle, WA, USA E-mail: rjl@uw.edu</p> | <p>Gunther Uhlmann Department of Mathematics University of Washington Seattle, WA, USA E-mail: gunther@math.washington.edu</p> | <p>Kyle T. Mandli Department of Applied Physics & Applied Mathematics Columbia University New York, NY, USA E-mail: kyle.mandli@columbia.edu</p> | <p>François Monard Department of Mathematics University of California Santa Cruz, CA, USA E-mail: fmonard@ucsc.edu</p> |
| <p>Randall J. LeVeque Department of Applied Mathematics University of Washington Seattle, WA, USA E-mail: rjl@uw.edu</p> | <p>Gunther Uhlmann Department of Mathematics University of Washington Seattle, WA, USA E-mail: gunther@math.washington.edu</p> | | | | |
| <p>Kyle T. Mandli Department of Applied Physics & Applied Mathematics Columbia University New York, NY, USA E-mail: kyle.mandli@columbia.edu</p> | <p>François Monard Department of Mathematics University of California Santa Cruz, CA, USA E-mail: fmonard@ucsc.edu</p> | | | | |