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Kaihang Guo

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Summary Ph.D student at Rice University who has strong mathematical background, with experience in numerical methods for partial differential equations and high performance GPU computing.

Education

Rice University *2016 – present*
Ph.D. in Computational and Applied Mathematics, GPA: 4.0/4.0
Advisor: Dr. Jesse Chan

New York University *2014 – 2016*
M.Sc. Degree in Mathematics, GPA: 3.6/4.0

Sichuan University, China *2010 –2014*
B.Sc. Degree in Applied Mathematics, GPA: 3.6/4.0

Work Experience

Scientific Software Developer Intern, Total, *Houston, TX* *May 2019 - Aug 2019*
- Assisted in the design of a multi-physics research simulator.
- Implemented the discontinuous Galerkin method for the numerical discretization of PDEs.
- Optimized algorithms for real-time performance using MPI parallelization.

Research Experience

Discontinuous Galerkin methods on moving meshes, Rice University, *Houston, TX* *Aug 2019 - Aug 2020*
- Developing discontinuous Galerkin methods based on the arbitrary Lagrangian-Eulerian framework.
- Designing an r-adaptive method to increase the local resolution for wave problems.
- Applying the discontinuous Galerkin solver to compute wave scattering from moving boundaries.

Multiwave imaging in complex media, Rice University, *Houston, TX* *Aug 2018 - May 2019*
- Developed high order discontinuous Galerkin methods for acoustic-elastic coupled media.
- Accelerated numerical implementations by GPU parallelization.
- Applied the discontinuous Galerkin solver to time-reversal method in photoacoustic imaging.

Bernstein-Bézier discontinuous Galerkin methods, Rice University, *Houston, TX* *Feb 2017 - Aug 2018*
- Developed a fast Bernstein polynomial L^2 projection algorithm.
- Applied fast Bernstein algorithms to weight-adjusted discontinuous Galerkin methods.
- Accelerated numerical implementations by GPU parallelization.

Structured background subtraction, New York University, *New York, NY* *Jan 2016 - May 2016*
- Utilized the sparsity-inducing norm in low-rank and sparse matrix decomposition.
- Applied the network flow algorithm to solve quadratic min-cost flow problems.
- Compared with conventional background subtraction techniques.

Skills

Numerical computing	linear solvers, numerical PDEs, parallel computing, optimization
Programming	Unix, Linux, C/C++, Fortran, Python, Matlab, MPI, CUDA, OCCA, Julia

Publications

Bernstein-Bézier weight-adjusted discontinuous Galerkin methods for wave propagation in heterogeneous media.
with J. Chan, Journal of Computational Physics, 2019. Link

A weight-adjusted discontinuous Galerkin method for wave propagation in coupled elastic-acoustic media.
with S. Acosta and J. Chan, Journal of Computational Physics, 2020. Link

Awards

Oil & Gas HPC Conference Graduate fellowship, Rice University *2017*
Awarded to students engaged in research related to high performance computing for Oil & Gas applications.

Jack C. Pollard Endowed Fellowship in Engineering, Rice University *2016*
Awarded to students for their educational achievements.

Graduate fellowship, Rice University *2016*
Awarded to students for their educational achievements.

Science Scholarship, Sichuan University *2012*
Awarded to top undergraduate students.