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 – Expected May 2021*
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

KNOWLEDGE AND SKILLS

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

WORK EXPERIENCE

Scientific Software Developer Intern at Total *May 2019 – Aug 2019*

· Assisted in the design of a multiphysics 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 *Aug 2019 – Aug 2020*

· Derived a skew-symmetric ALE-DG methods for wave propagation on moving domains.
· Applied a weight-adjusted approach to reduce cost for the evolution of solutions.
· Implemented ALE-DG methods using non-polynomial B-splines on tensor elements.

Multiwave imaging in complex media *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 *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 *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.

PUBLICATIONS

Bernstein-Bézier weight-adjusted discontinuous Galerkin methods for wave propagation in heterogeneous media, with J. Chan, Journal of Computational Physics, 2020. 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

High order weight-adjusted discontinuous Galerkin methods for wave propagation on moving curved meshes, with J. Chan, in preparation.

PRESENTATIONS

Seminar, Chongqing University, Department of Mathematics, Chongqing, China	*Jun 2020*
Seminar, Nanjing University, Department of Mathematics, Nanjing, China	*May 2020*
SIAM Texas-Louisiana Sectional Meeting, Dallas, TX, USA	*Nov 2019*
Graduate Seminar, Rice University, Houston, TX, USA	*Sep 2019*
The US National Congress on Computational Mechanics, Austin, TX, USA	*Jul 2019*
North American High Order Methods Conference, San Diego, CA, USA	*Jun 2019*
Finite Element Rodeo, Austin, TX, USA	*Mar 2019*

AWARDS

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

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.