

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

Oil & Gas HPC Conference Graduate fellowship , Rice University <i>Awarded to students engaged in research related to high performance computing.</i>	<i>2017</i>
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Jack C. Pollard Endowed Fellowship in Engineering , Rice University <i>Awarded to students for their educational achievements.</i>	<i>2016</i>
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Graduate fellowship , Rice University <i>Awarded to students for their educational achievements.</i>	<i>2016</i>
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Science Scholarship , Sichuan University <i>Awarded to top undergraduate students.</i>	<i>2012</i>
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