

Maximilian H. Bremer

CONTACT INFORMATION

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EDUCATION

University of Texas at Austin, Institute for Computational Engineering and Sciences

Ph.D. Candidate, Computational Science, Engineering, and Mathematics.
M.Sc., Computational Science, Engineering, and Mathematics, May 2018.
Advisor: Clint Dawson
Expected Graduation Date: Summer 2020

University of Cambridge,

M.A.St., Part III Pure Mathematics, June 2015
Emphasis: Partial Differential Equations / Analysis

The University of Texas at Austin

B.Sc., Aerospace Engineering, May 2014.
B.Sc., Applied Mathematics, May 2014.

RESEARCH EXPERIENCE

Keywords

Task-based parallelism • High performance computing • Discontinuous Galerkin finite elements
• Shallow water equations • Hurricane storm surge

The University of Texas at Austin

Fall 2015–present

Computational Hydraulics Group

- ‡ Developing dynamic load balancing strategies using HPX's Active Global Address Space (AGAS) to offset load imbalances generated by the simulation of inundation caused by hurricane storm surge.
- ‡ Compared and analyzed performance of flat (non-blocking) MPI versus an HPX-based parallelization on Knights Landing and Skylake architectures on Stampede2.
- ‡ Refactored in-house discontinuous Galerkin storm surge code to improve productivity. Introduced software engineering best practices, e.g. continuous integration and unit testing.

Lawrence Berkeley National Lab

Summer 2016

Computer Architecture Group

- ‡ Examined load balancing strategies for asynchronous execution models of hurricane storm surge simulations.
- ‡ Developed and validated a discrete event simulator of the application code for rapid prototyping of load balancing strategies.

PUBLICATIONS

Journal Articles

1. **M.B.**, Kazbek Kazhyken, Hartmut Kaiser, Craig Michoski, Clint Dawson, "Performance Comparison of HPX Versus Traditional Parallelization Strategies for the Discontinuous Galerkin Method", *Submitted to J. Sci. Comput.*, 2018.

Presentations/Talks

7. **M.B.**, Kazbek Kazhyken, Hartmut Kaiser, Craig Michoski, Clint Dawson, "Task-based Parallelism for Finite-Element Models of Shallow Water Flows", *World Congress in Computational Mechanics*, July 24, 2018.
6. **M.B.**, "Computational Modeling of Hurricane Storm Surge", *Harrington Annual Research Symposium*, April 10, 2018.

5. **M.B.**, Zach Byerly, Hartmut Kaiser, Craig Michoski, Clint Dawson, “Performance Comparison of HPX versus Traditional Parallelization Models for Finite-Element Models of Environmental Flows”, *American Meteorological Society Annual Meeting*, January 10, 2018.
4. **M.B.**, “Wrangling Concurrency with HPX”, *ICES Seminar–Student Forum*, December 8, 2017.
3. **M.B.**, Craig Michoski, Zach Byerly, Hartmut Kaiser, Clint Dawson, “Optimizing Discontinuous Galerkin Finite Element Kernels on Knights Landing Chips”, *Texas Applied Mathematics and Engineering Symposium*, September 22, 2017.
2. **M.B.**, John Bachan, Cy Chan, “Asynchronous Load Balancing for Hurricane Storm Surge Simulations”, *LBL Computing Sciences Seminar*, February 16, 2017.
1. **M.B.**, Clint Dawson, Zach Byerly, Hartmut Kaiser, Craig Michoski, Andreas Schäfer, “Application of High Performance ParallelX (HPX) for High Performance Computing of Hurricane Storm Surge”, *American Meteorological Society Annual Meeting*, January 25, 2017.

HONORS AND AWARDS

Honors and Awards

Department of Energy Computational Science Graduate Fellowship (2015)
 Donald D. Harrington Fellowship (2015)
 Cockrell School of Engineering Outstanding Scholar/Leader Award (2014)
 Graham F. Carey Scholarship in Computational Science (2013)

COMPUTER SKILLS

Languages

‡ C++, Python, Bash Scripting, FORTRAN, MatLab, L^AT_EX

Software Development

DGSWEM-v2

<https://github.com/UT-CHG/dgswemv2>

‡ Discontinuous Galerkin (DG) finite element code for the simulation of coastal flows.
 ‡ Provides MPI+OpenMP and HPX parallelization back-ends.
 ‡ License: MIT

Areas of Exposure

‡ *Packages*: MPI, OpenMP
 ‡ *Libraries*: HPX, Eigen, Blaze, UPC++
 ‡ *Software Engineering*: git, make, cmake, CircleCI, Docker

ACADEMIC SERVICE

Conferences/Seminars Organized

‡ Co-organizer, <i>ICES Seminar–Babuška Forum</i>	Fall 2018–present
‡ Co-organizer, <i>Texas Applied Mathematics and Engineering Symposium</i>	September 2017

Societal Membership

‡ Society for Industrial and Applied Mathematics (SIAM)