

Haixiang Liu

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EDUCATION

Ph.D. in Computer Sciences 2012-Present

University of Wisconsin - Madison

Area of Research - High efficiency Numerical Solvers for Large Scale Sparse Linear Systems.

Minor in Mechanical Engineering

BSc. in Computer Science and Applied Mathematics 2007-2011

Hong Kong University of Science and Technology

WORK EXPERIENCE

Research Intern 2016 Summer

Disney Animation Studio, Internship

Developed an adaptive FEM simulation framework for animation production pipeline

SELECTED CLASSES

Intermediate Fluid Dynamics	Automatic Controls Lab	Nonlinear Optimization
Theory of Elasticity	Advanced Machine Learning	FE for Biomechanics
Finite Elements	Adv Computer Architecture	Computer Animation

RESEARCH PROJECTS

A Scalable Schur-complement Fluids Solver for Heterogeneous Compute Platforms

Developed a domain decomposition method for solving large scale poisson problem utilizing multi-accelerators(GPU, Intel PHI) platforms by minimizing the communication across PCI-E. 2014-2016

Power Diagrams and Sparse Paged Grids for High Resolution Adaptive Liquids

Developed a second-order accurate adaptive free surface fluid simulator. Contributions includes: an high resolution level set tracking and advection scheme; fast marching on octree; 2nd order poisson discretization and solver for adaptive grid using power diagram. 2016-2017

Narrow-Band Topology Optimization on a Sparsely Populated Grid

Developed an efficient Multigrid precondition conjugate gradient solver using SIMD instructions which enabled billion degrees of freedom topology optimization on a single workstation. 2017-2018

Stencil Aware Multigrid Method for Linear Elasticity

To improve the convergence of the geometric multigrid method for linear elasticity by introducing additional auxiliary variables. 2018-present

Hierarchical Direct Solver for Cartesian Grid Discretization

Developed a memory efficient hierarchical direct solver for cartesian grid discretization, using recursive Schur-complement method. 2018-present

SPGrid Plugin for Renderman™

Developed SPGrid levelset and volume rendering plugin for Renderman™ 2016-2018

SKILLS

<i>Languages</i>	Chinese (native language), English (fluent)
<i>Programming</i>	C++, CUDA, JAVA, MATLAB, GLSL, Intel Intrinsics, MPI, OpenMP
<i>Softwares</i>	Blender, Renderman, PARDISO, Unity3D
<i>Education</i>	Fluid Dynamics, Continuum Mechanics, Finite Element Method Multigrid Method, Linear Algebra, Numerical Solvers

PUBLICATIONS

H. Liu*, Y. Hu*, B. zhu, W. Matusik, E. Sifakis "Narrow-Band Topology Optimization on a Sparsely Populated Grid" Under review (Submitted to Proceedings of ACM SIGGRAPH Asia), 2018

M. Aanjaneya*, M. Gao*, **H. Liu**, C. Batty, E. Sifakis "Power Diagrams and Sparse Paged Grids for High Resolution Adaptive Liquids" ACM Transactions on Graphics 36:4 (Proceedings of ACM SIGGRAPH), 2017

H. Liu, N. Mitchell, M. Aanjaneya, E. Sifakis "A scalable Schur-complement fluids solver for heterogeneous compute platforms" ACM Transactions on Graphics 35:6 (Proceedings of ACM SIGGRAPH Asia), 2016