June 2019

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Education: Ph.D. Applied Mathematics, Cornell University, 1993
M.S. Applied Mathematics, Cornell University, 1991
B.S. Applied Mathematics, Engineering & Physics,
University of Wisconsin-Madison, 1988.

Ph.D. Thesis: *Mesh Generation with Provable Quality Bounds*, S. A. Vavasis, 1993

Positions: *Sandia National Laboratories:* 1992—
Principal Member Technical Staff, Center for Computing Research, 2007—
Manager, Optimization and Uncertainty Estimation Dept., 2002—2007
Cubit Project Leader, 2000-2002. Principal Member Technical Staff, 2001—2002
Senior Member Technical Staff, 1994—2001
AMS Fellow a.k.a. von Neumann Fellow, 1992—1994

Xerox PARC: Summer Research Intern, 1991

Selected Achievements

Mesh Generation
- Tetrahedral and higher-dimensional simplicial meshes with provable-quality
  - Linear-size nonobtuse triangulations
- Dual-based "Whisker Weaving" algorithms for hex meshing
  - Characterization of surfaces with compatible hexahedral volume meshes
- Hex connectivity changes for quality improvement
  - Geode-template for gluing tet and hex meshes, grafting disparate meshes
- Interval matching, optimizing the number of mesh edges for each geometric curve
  - Selecting corners of templates for structured meshes

Informatics
- Well-spaced sample distributions in low-to-high dimensions
  - Poisson-disk point clouds, extended to provable-quality random meshes
  - Voronoi Crust surface reconstruction and volume meshing with Voronoi cells
- Flexible approximate counting
- Computational topology and statistics for characterizing text, rocks, and network faults

Software
- Cubit Mesh generation
- GeoPlace and SimpleMPS (open source)
- CoreSim SoSAT discrete event logistics simulation

Leadership
- Int. Meshing Roundtable and Symp. Computational Geometry conference committees
- Cubit Project Leader
- Department manager with line and program responsibilities

June 2019

Statement of Work

I research algorithms, sometimes develop production software, and occasionally solve applications. My technical work spans computational geometry, computer graphics, spatial distributions, discrete algorithms and informatics. A special focus is mesh generation. I also study information algorithms and theory, sometimes with geometric and topological content, in partnership with statisticians. I managed Sandia's optimization department, with program and staff direction and evaluation responsibilities.

I research mesh generation, geometric modeling, surface reconstruction, and high dimensional space exploration. I research random point cloud and hyperplane sampling algorithms, for computer graphics, mesh generation, and design of computer experiments related to uncertainty quantification. In data analysis I generalized approximate-counting of data streams. I led a team on "forecasting" (prediction, uncertainty, and statistics) over large-scale informatics graphs. I worked on several aspects of a data analysis pipeline including the geometry of information-theory distance functions, and researched and implemented a flexible approximate counting scheme. In computational topology I led a small project and hosted a workshop, and have worked with others to analyze text documents, rock pores, and computer network faults. I designed and prototyped a mobile ad-hoc networking protocol; researched validation guidelines for computer models of humans cognition; and co-designed and developed the military logistics simulation CoreSim within SoSAT.

I managed Sandia's optimization and uncertainty estimation department from 2002-2007, with line and program responsibilities. I hired people, increasing staff from 5 to 8; mentored career planning; performed merit/salary review. The department's main product is the DAKOTA optimization and uncertainty quantification software, which provides information about ranges of scientific simulation outcomes. This is a key component of DOE's Advanced Simulation and Computing program (ASC), the foundation for Science Based Stockpile Stewardship. My department had DOE NNSA and Office of Science funding, and several commercial and university partnerships. Programmatically, I served on the Laboratory Directed Research and Development (LDRD) Computer and Information Sciences Investment Area Team. I also served on the ASC Algorithms and ASC Validation & Verification programs. We selected which proposals and staff to fund.

I lead Sandia's Cubit mesh generation toolkit from 2000-2002. Cubit, as DAKOTA, is a critical and unique component of the ASC (then ASCI) program. I was responsible for the technical agenda of the group; representing the project internally and externally; and ensuring we provided training and support for our software. I oversaw the technical work of 30 people including 15 full-time Sandians and contractors; several commercial, university, and lab R&D collaborations; and a three-person subteam solving applications with our software. Prior to project leadership, I researched new meshing algorithms and developed production level software. My "existence proof" for hexahedral meshes showed that, contrary to folklore, a topologically-correct hexahedral mesh exists that is compatible with a prescribed boundary mesh, given very mild necessary and sufficient conditions on the boundary mesh.

Prior to 1995, I researched tetrahedral and triangulation algorithms with provable element shape and element count guarantees. My PhD thesis described the first algorithm for tetrahedral meshing with these kinds of theoretical guarantees.

University and Corporate programs

I served as a Sandia representative for research contracts with University of Michigan (2009); University of Iowa (2009); Lawrence Livermore National Laboratory (2006); Harvey Mudd College Clinic (2004); Brigham Young University (1999—2002); Caterpillar (2001—2002); Goodyear (2001—2002). I host sabbatical faculty, post-docs, summer graduate and undergraduate college students, which includes developing a research project with them and guiding their work. I served on the degree committee of Jason Shepherd (BYU), Steve Jankovich (BYU), and Michelle Hummel (UNM).

Communications

I've represented Sandia technical groups, especially the Cubit project and the Optimization department, in many overview talks, software demonstrations, training classes, project reports, and funding requests given to sponsors, review panels, and potential customers. Examples include Tri-lab conferences; ASCI PI project meetings; Center external review; Cubit overviews to Unigraphics and Coventor; Cubit user tutorials; ASCI, CSRF, LDRD, and MICS reports and funding proposals.

Software

Cubit Mesh generation
SGM geometric modeling (open source)
Spoke-Darts (open source)
GeoPlace and SimpleMPS (open source)
CoreSim SoSAT discrete event logistics simulation
GitHub username samitch

Awards

Outstanding Mentor, Sandia, 2012.
Future Force Integrated Support Team, FIST, coin, for CoreSim, 2009.
Department of Energy, Defense Programs Award of Excellence, NNSA, 2006.

Professional Activities

International Meshing Roundtable, committee, 2017 and 2018
CAD guest editor for extended versions of selected IMR papers, 2017 and 2018
NSF proposal review panel 2016
USNCCM minisymposium chair, Voronoi Dual Meshing and Simulation, 2015
SIAM-UQ 12 minisymposium organizer, speaker, Ensembles of Random Points for UQ, 2012
Adjunct Faculty, University of New Mexico, Math Department, sponsor Vageli Coutsias, 2010
Workshop on Combinatorial Algebraic Topology (CAT), chair, 2009
Intel International Science and Engineering Fair 2007 Grand Awards Judge (Mathematics).
Committee Member, Applied Track, Symposium on Computation Geometry, 2000
Middle School Math Textbook screener, 1998—1999 Instructional Materials Commission of the New Mexico Board of Education
Conference Chair, International Meshing Roundtable, October 1996

Proposal Reviewer:
NSF; DOE ASCR; Sandia LDRD

Journals and Conference Reviewer:
ACM Computing Surveys; SciTech; ACM TOG; ACM SIGGRAPH; ACM TOMS; SIGGRAPH-Asia; IJNME; Springer book chapter; Eurographics; IEEE Trans. on Vis. and Comp. Graphics; Computers and Graphics CAG; SIAM Journal on Scientific Computing (SISC); International Journal of Computational Geometry and Applications (IJCGA); Computational Geometry, Theory and Applications (CGTA); International Meshing Roundtable (IMR); Symposium on Computational Geometry (SoCG); Engineering with Computers; IEEE Transactions on Parallel and Distributed Systems; ASME Journal of Mechanical Design; Discrete Mathematics; International Journal of Numerical Methods in Engineering (IJNME); SIAM Journal on Scientific Computing; and Algorithmica.

Professional Memberships
ACM Association for Computing Machinery, Professional Member 1994— , Senior 2009—.
SIAM Society for Industrial and Applied Mathematics

Academic Honors Fraternities
Phi Beta Kappa
Tau Beta Pi

Teaching experience
Algorithmic Geometry and Mesh Generation, graduate course, University of New Mexico, 2010.
Graduate Teaching Assistant, Cornell University, Calculus, Game Theory, 1988—1991.

Volunteer Activities
New Mexico Cross Country Ski Club board 2017—
Rio Grande Turtle and Tortoise Club board and newsletter editor, 2014—2016
Presidential Volunteer Service Award, 2006—2008
Boy Scouts of America, Scoutmaster 2003—2008, Assistant 2002, 2009
American Youth Soccer Organization, AYSO, Coach 2002—2005, Referee 1997—2003

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Publications

See my publications website at
http://www.cs.sandia.gov/~samitch/papers%20guide/index.html

Spoke-Darts for High-Dimensional Blue-Noise Sampling, Scott A. Mitchell, Mohamed S. Ebeida, Muhammad A. Awad, Chonhyon Park, Anjul Patney, Ahmad A. Rushdi, Laura P. Swiler, Dinesh Manocha, and Li-Yi Wei, ACM Trans. Graph., and SIGGRAPH 2018

Fast Approximate Union Volume in High Dimensions with Line Samples, Scott A. Mitchell, Muhammad A. Awad, Mohamed S. Ebeida, Laura P. Swiler, Tech report SAND2018-8684, 2018. Based on conference presentation Balloon Darts:Fast Approximate Union Volume in High Dimensions with Line Samples in SIAM conference on Geometric & Physical Modeling, GD/SPM 2013

VoroCrust: Voronoi Meshing Without Clipping, Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, Ahmed H. Mahmoud, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi, arXiv:1902.08767 and in submission, 2019

Sampling Conditions for Conforming Voronoi Meshing by the VoroCrust Algorithm, Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, Ahmed H. Mahmoud, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi, 34th International Symposium on Computational Geometry, SoCG, 2018

VoroCrust Illustrated: Theory and Challenges, Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, Ahmed H. Mahmoud, Scott A. Mitchell, John D. Owens and Ahmad A. Rushdi, 34th International Symposium on Computational Geometry (SoCG 2018) Video Review, 2018

Sampling Conditions for Clipping-free Voronoi Meshing by the VoroCrust Algorithm, Scott A. Mitchell, Ahmed Abdelkader (speaker), Ahmad Rushdi, Mohamed Ebeida, Ahmed Mahmoud, John Owens, and Chandrajit Bajaj, Fall Workshop on Computational Geometry, 2017

A Seed Placement Strategy for Conforming Voronoi Meshing. Ahmed Abdelkader, Chandrajit L. Bajaj, Mohamed S. Ebeida, and Scott A. Mitchell, 29th Canadian Conference on Computational Geometry CCCG, 2017

VoroCrust: Simultaneous Surface Reconstruction and Volume Meshing with Voronoi cells, Scott A. Mitchell's talk at POEMS 2015

Voronoi Dual Meshing and Simulation, USNCCM 2015, TS11 MS714, minisymposium chair Scott Mitchell. Talk VoroCrust Geometry: 3D polyhedral meshing with true Voronoi cells conforming to prescribed surface points.

Footprint Placement for Mosaic Imaging by Sampling and Optimization, Scott A. Mitchell, Christopher G. Valicka, Stephen Rowe, and Simon X. Zou, The 28th International Conference on Automated Planning and Scheduling , 2018

Nonoverlapping Grid-aligned Rectangle Placement for High Value Areas, Stephen Rowe, Christopher G. Valicka, Scott A. Mitchell and Simon X. Zou, 29th Canadian Conference on Computational Geometry CCCG, 2017

Dynamic Multi-Sensor Multi-Mission Optimal Planning Tool, Christopher G. Valicka, Stephen Rowe, Simon X. Zou, Scott A. Mitchell, William R. Irelan, Eric L. Pollard, Deanna Garcia, Gabriel Hackebeil, Andrea Staid, Mark D. Rintoul, Jean-Paul Watson, William E. Hart, Sivakumar Rathinam and Lewis Ntaimo, LDRD project final technical report, 2016

Mixed -Integer Formulations for Constellation Scheduling, Christopher G. Valicka, William E. Hart, M. D. Rintoul, Scott A. Mitchell, Eric L. Pollard, Simon X. Zou, and Stephen Rowe, Advanced Maui Optical and Space Surveillance Technologies Conference, 2015

Persistent Homology Fingerprinting of Microstructural Controls on Larger-scale Fluid Flow in Porous Media, poster and abstract, Chul Moon, Scott A. Mitchell, Nickolas Callor, Thomas A. Dewers, Jason E. Heath, Hongkyu Yoon, and Gregory R. Conner, AGU Fall Meeting Abstracts, 2017

Statistical Inference for Porous Materials Using Persistent Homology, Chul Moon, Scott A. Mitchell, and Jason E. Heath, CCR Summer Proceedings technical report, 2017

Statistical Inference Over Persistent Homology Predicts Fluid Flow in Porous Media, Chul Moon, Scott A. Mitchell, Jason E. Heath, and Matthew Andrew, in submission, 2019

Meshes Optimized for Discrete Exterior Calculus (DEC), Sarah C. Mousley, Michael Deakin, Patrick Knupp, and Scott A. Mitchell, CCR Summer Proceedings, 2017

All-Hex Meshing of Multiple-Region Domains without Cleanup, Muhammad A. Awad, Ahmad A. Rushdi, Misarah A. Abbas, Scott A. Mitchell, Ahmed H. Mahmoud, Chandrajit L. Bajaj, and Mohamed S. Ebeida, Proceedings 25th International Meshing Roundtable (IMR25)

Visco-TTI-Elastic FWI using Discontinuous Galerkin, Curtis C. Ober, Thomas M. Smith, James R. Overfelt, S. Scott Collis, Gregory J. von Winckel, Bart G. van Bloemen Waanders, Nathan J. Downey, Scott A. Mitchell, Stephen D. Bond, David F. Aldridge, and Jerome R. Krebs, Society of Exploration Geophysicists, SEG Technical Program Expanded Abstracts, 2016

Curve Reconstruction with Many Fewer Samples, Stefan Ohrhallinger, Scott A. Mitchell and Michael Wimmer, Computer Graphics Forum, SGP Symposium on Geometry Processing, 2016

Disk Density Tuning of a Maximal Random Packing, Mohamed S. Ebeida, Ahmad A. Rushdi, Muhammad A. Awad, Ahmed H. Mahmoud, Dong-Ming Yan, Shawn A. English, John D. Owens, Chandrajit L. Bajaj and Scott A. Mitchell, Computer Graphics Forum, SGP Symposium on Geometry Processing, 2016

POF-Darts: Geometric Adaptive Sampling for Probability of Failure, Mohamed S. Ebeida, Scott A. Mitchell, Laura P. Swiler, Vicente J. Romero, and Ahmad A. Rushdi, Reliability Engineering & System Safety, 2016

A Set of Test Problems and Results in Assessing Method Performance for Calculating Low Probabilities of Failure, Vicente Romero, Laura Swiler, Mohamed Ebeida, and Scott Mitchell, AIAA SciTech / 18th AIAA Non-Deterministic Approaches Conference, 2016

Robust All-Quad Meshing of Domains with Connected Regions, Ahmad A. Rushdi, Scott A. Mitchell, Chandrajit L. Bajaj and Mohamed S. Ebeida, 24th International Meshing Roundtable, 2015.

All-Quad Meshing without Cleanup, Ahmad A. Rushdi, Scott A. Mitchell, Ahmed H. Mahmoud, Chandrajit C. Bajaj, and Mohamed S. Ebeida, Computer-Aided Design, 2016

Efficient Probability of Failure Calculations for QMU using Computational Geometry LDRD 13-0144 Final Report, Scott A. Mitchell, Mohamed S. Ebeida, Vicente J. Romero, Laura P. Swiler, Ahmad A. Rushdi, and Ahmed Abdelkader, tech report, 2015

Exercises in High-Dimensional Sampling: Maximal Poisson-disk Sampling and k-d Darts, Mohamed S. Ebeida, Scott A. Mitchell, Anjul Patney, Andrew A. Davidson, Stanley Tzeng, Muhammad A. Awad, Ahmed H. Mahmoud, and John D. Owens, chapter in the book " Topological and Statistical Methods for Complex Data," 2015

Delaunay Quadrangulation by Two-coloring Vertices, Scott A. Mitchell, Mohammed A. Mohammed, Ahmed H. Mahmoud and Mohamed S. Ebeida, 23rd IMR proceedings, 2014

Steiner Point Reduction in Planar Delaunay Meshes, Ahmed Abdelkader, Scott A. Mitchell and Mohamed S. Ebeida, Symposium on Computational Geometry, Young Researchers Forum, 2014

Improved Poisson-disk Sampling for Meshing applications, Mohamed S. Ebeida and Scott A. Mitchell, Proceedings of the 11th World Congress on Computational Mechanics (WCCM XI), 2014

Improving Spatial Coverage while Preserving the Blue Noise of Point Sets, Mohamed S. Ebeida, Muhammad A. Awad, Xiaoyin Ge, Ahmed H. Mahmoud, Scott A. Mitchell, Patrick M. Knupp and Li-Yi Wei, Special issue of the Journal of Computer Aided Design dedicated to the proceedings of the 2013 SIAM Conference on Geometric and Physical Modeling, SIAM GD/SPM13, 2013

Simple and Fast Interval Assignment Using Nonlinear and Piecewise Linear Objectives, Scott A. Mitchell, IMR International Meshing Roundtable 2013

Sifted Disks, Mohamed S. Ebeida, Ahmed H. Mahmoud, Muhammad A. Awad, Mohammed A. Mohammed, Scott A. Mitchell, Alexander Rand, and John D. Owens, Eurographics 2013

k-d Darts: Sampling by k-Dimensional Flat Searches, Mohamed S. Ebeida, Anjul Patney, Scott A. Mitchell, Keith R. Dalbey, Andrew A. Davidson, and John D. Owens, Transactions on Graphics, vol. 33, no. 1, 2014.

Characterizing Sample Distribution Properties and their Impact on Experimental Design, SIAM UQ14 minisymposium MS17, 2014

Variable Radii Poisson-Disk Sampling, Scott A. Mitchell, Alexander Rand, Mohamed S. Ebeida and Chadrajit Bajaj. 24th Canadian Conference on Computational Geometry 2012.

High-Quality Parallel Depth-of-Field Using Line Samples, Stanley Tzeng, Anjul Patney, Andrew Davidson, Mohamed S. Ebeida, Scott A. Mitchell and John D. Owens. High Performance Graphics 2012

A Simple Algorithm for Maximal Poisson-Disk Sampling in High Dimensions, Mohamed S. Ebeida, Scott A. Mitchell, Anjul Patney, Andrew A. Davidson and John D. Owens. Eurographics, 2012.

Uniform Random Voronoi Meshes, Mohamed S. Ebeida and Scott A. Mitchell. Proceedings 20th International Meshing Roundtable, 2011.

Flexible Approximate Counting, Scott A. Mitchell and David M. Day. IDEAS2011, 15th International Database Engineering & Applications Symposium, 2011.

Efficient and Good Delaunay Meshes from Random Points, Mohamed S. Ebeida, Scott A. Mitchell, Andrew A. Davidson, Anjul Patney, Patrick M. Knupp, and John D. Owens. Special issue of Journal of Computer-Aided Design dedicated to proceedings of SIAM Conference on Geometric and Physical Modeling (GD/SPM11), 2011.

Efficient Maximal Poisson-Disk Sampling, Mohamed S. Ebeida, Anjul Patney, Scott A. Mitchell, Andrew Davidson, Patrick M. Knupp, and John D. Owens. ACM SIGGRAPH 2011.

Geometric Comparison of Popular Mixture Model Distances, Scott A. Mitchell, talk at Foundations of Topological Analysis workshop in VizWeek 2010, Sandia technical report SAND2010-6286C, and Journal of Modern Mathematics Frontier Vol. 1 Iss. 4, December 2012

Statistical Analysis of HPC Alerts and Developments in Root Cause Analysis, Joel M. Vaughan, Jon R. Stearley, Scott A. Mitchell, and George Michailidis. CSRI Summer Proceedings 2010, pages 331-342, SAND report SAND2010-8783P.

Multifractal Dimensions Using Maximal Simplices and Python Extensions to TEVA-SPOT, Jesse Berwald, David M. Day, Scott A. Mitchell, and Afra Zomorodian. CSRI Summer Proceedings 2010, pages 178-195, SAND report SAND2010-8783P.

Distinguishing Documents, Scott A. Mitchell. LDRD 149045 Final Report, SAND report SAND2010-6678, September 2010.

Root Cause Analysis of Errors for High Performance Computing, Joel M. Vaughan and Jon R. Stearley and Scott A. Mitchell and George Michailidis. CSRI Summer Proceedings 2009, pages 177-186, SAND report SAND2009-3083P.

Summary of the CSRI Workshop on Combinatorial Algebraic Topology (CAT): Software, Applications, & Algorithms, Janine C. Bennett, David M. Day, Scott A. Mitchell. SAND report SAND2009-7777, 2009.

The RatNest Routing Protocol for Ad-Hoc Circuits Over Fixed Radio Networks, Scott A. Mitchell, SAND report SAND2009-1895C, 2009.

R&D for Computational Cognitive and Social Models: Foundations for Model Evaluation through Verification and Validation, McNamara, Laura A., Timothy G. Trucano, George A. Backus, Scott A. Mitchell. SAND Report SAND2008-6453, September 2008.

Distance-Avoiding Sets for Extremely Low-Bandwidth Authentication, Michael J. Collins and Scott A. Mitchell. Int'l Conf. on Sequences and Their Applications (SETA 2008).

New Processes for Innovative Microsystems Engineering with Predictive Simulation, Scott A. Mitchell, Ann E. Mattsson, and Stephen W. Thomas, SAND report SAND2007-4888, August 2007.

<Publication hiatus due to serving as a Department Manager 2002—2007>

A Technical History of Hexahedral Mesh Generation, Scott Mitchell, 11th International Meshing Roundtable, short course, 2002.

Mesh Generation for High Performance Computing. Part II: Mesh Generation for Massively Parallel-Based Analysis. Scott Mitchell, Patrick Knupp, and Timothy Tautges. Tutorial S6B, Supercomputing 2000.

Cubit Software Demonstration, Department of Energy, Accelerated Strategic Computing Initiative (ASCI), Research Exhibitor Booth R1124, Scott A. Mitchell. Supercomputing 2000.

The Cleave and Fill Tool: An All-Hexahedral Refinement Algorithm for Swept Meshes, Michael Borden, Steven Benzley, Scott A. Mitchell, David R. White and Ray Meyers. Proceedings, 9th International Meshing Roundtable, Sandia National Laboratories, pp. 69-76, 2000.

Methods for Multisweep Automation, Shepherd, Jason, Scott A. Mitchell, Patrick Knupp, and David White. Proceedings 9th International Meshing Roundtable, Sandia National Laboratories, pp. 77-87, 2000.

Interval Assignment for Volumes with Holes, Shepherd, Jason, Steven Benzley and Scott A. Mitchell. International Journal for Numerical Methods in Engineering, John Wiley, Vol 49, Num 1, pp. 277-288, September 2000.

Integration of Mesh Optimization with 3D All-Hex Mesh Generation, Patrick Knupp and Scott A. Mitchell, SAND report SAND99-2852, 1999.

A Method for Controlling Skew on Linked Surfaces, R. A. Kerr, S. E. Benzley, D. R. White, and S. Mitchell. Proc. 8th International Meshing Roundtable, 377- 385, 1999.

Quality Mesh Generation in Higher Dimensions, Scott A. Mitchell and Stephen A. Vavasis. SIAM Journal on Computing Volume 29, Number 4, pp. 1334-1370, 1999.

The Graft Tool: an All-Hexahedral Transition Algorithm for Creating a Multi-Directional Swept Volume Mesh, S. R. Jankovich, S. E. Benzley, J. F. Shepherd, and S. A. Mitchell. Proc. 8th International Meshing Roundtable, 387-392, 1999.

Reliable Whisker Weaving via Curve Contraction, N. T. Folwell, and S. A. Mitchell. Proc. 7th International Meshing Roundtable, 365-378, 1998.

The All-Hex Geode-Template for Conforming a Diced Tetrahedral Mesh to Any Diced Hexahedral Mesh, S. A. Mitchell. Proc. 7th International Meshing Roundtable, 295-305 (1998), and Engineering with Computers, 15: 228-235.

The Geode Algorithm: Combining Hex/Tet Plastering, Dicing and Transition Elements for Automatic, All-Hex Mesh Generation, R. W. Leland, D. J. Melander, R. W. Meyers, S. A. Mitchell, and T. J. Tautges. Proc. 7th International Meshing Roundtable, 515-521, 1998.

High Fidelity Interval Assignment, S. A. Mitchell. Proc. 6th International Meshing Roundtable, 33-44 (1997), and International Journal of Computational Geometry and Applications Vol. 10, No. 4 (2000) 399-415.

An Immersive Environment for Exploration of CUBIT Meshes, C. J. Pavlakos, J. S. Jones, and S. A. Mitchell. Proc. 6th International Meshing Roundtable, 47-65, 1997.

A Global Optimization Approach to Quadrilateral Meshing, J. Jung, C. Dohrmann, W. Witkowski, P. Wolfenberger, W. Gerstle, S. Mitchell, M. Panthaki, and D. Segalman. Proc. 6th International Meshing Roundtable, 155-167, 1997.

Choosing Corners of Rectangles for Mapped Meshing, S. A. Mitchell. Proc. Thirteenth annual symposium on Computational Geometry, 87-93, 1997.

Forming and Resolving Wedges in the Spatial Twist Continuum, T. D. Blacker, S. A. Mitchell, T. J. Tautges, P. Murdoch, and S. Benzley. Engineering with Computers 13:35-47 (1997).

The Spatial Twist Continuum: A Connectivity Based Method for Representing All-Hexahedral Finite Element Meshes, P. Murdoch; S. Benzley; T. Blacker; and S.A. Mitchell. Finite Elements in Analysis and Design, Volume 28, Number 2, 15 December 1997, Elsevier, pp. 137-149(13)

The Whisker Weaving Algorithm: a Connectivity Based Method for Constructing All-Hexahedral Finite Element Meshes, T. J. Tautges, T. D. Blacker, S. A. Mitchell, Int. J. Numer. Methods Engrg. 39:19 (1996), pp. 3327-3350.

A Characterization of the Quadrilateral Meshes of a Surface Which Admit a Compatible Hexahedral Mesh of the Enclosed Volume, S. A. Mitchell. Proc. 13th Annual Symposium on Theoretical Aspects of Computer Science (STACS `96), Lecture Notes in Computer Science 1046, Springer, pages 465-476, 1996.

An Aspect Ratio Bound for Triangulating a d-Grid Cut by a Hyperplane. S. A. Mitchell and S. A. Vavasis. Proc. 12th Annual Symposium on Computational Geometry, (1996) 48-57.

Progress Report on the Whisker Weaving All-Hexahedral Meshing Algorithm, Timothy J. Tautges and Scott A. Mitchell. 5th International Conference on Numerical Grid Generation in Computational Field Simulations, Mississippi State University, pp. 659-670, April 1996.

Pillowing Doublets: Refining a Mesh to Ensure that Faces Share at Most One Edge, S. A. Mitchell and T. J. Tautges. Proc. 4th International Meshing Roundtable, 231-240, 1995.

Hexahedral Mesh Generation via the Dual, S. Benzley, T. D. Blacker, S. A. Mitchell, P. Murdoch, and T. J. Tautges. Proc. 11th Annual Symp. on Computational Geometry, C4-C5, 1995.

Whisker Weaving: Invalid Connectivity Resolution and Primal Construction Algorithm, Timothy J. Tautges and Scott A. Mitchell. Proceedings, 4th International Meshing Roundtable, SAND95-2130, Sandia National Laboratories, pp.115-127, October 1995.

Cardinality Bounds for Triangulations with Bounded Minimum Angle, S. A. Mitchell, Sixth Canadian Conference on Computational Geometry, 326-331, 1994.

Linear-Size Nonobtuse Triangulation of Polygons, M. Bern, S. A. Mitchell and J. Ruppert. 10th Annual Symposium on Computational Geometry (1994), 121-130; and Disc. Comput. Geom. 14 (1995) 411-428.

CUBIT Mesh Generation Enviroment Users Manual, vol. 1, T.D. Blacker, S. Benzley, S. Jankovich, R. Kerr, J. Kraftcheck, R. Kerr, P. Knupp, R. Leland, D. Melander, R. Meyers, S. Mitchell, J. Shepard, T. Tautges, D. White. Sandia National Laboratories, Albuquerque, NM, 1994. SAND94-1100

Refining a Triangulation of a Planar Straight-Line Graph to Eliminate Large Angles, S. A. Mitchell. Thirty-fourth Annual Symposium on Foundations of Computer Science (FOCS '93), 583-591.

Finding a Covering Triangulation Whose Maximum Angle is Provably Small, S. A. Mitchell, Seventeenth Annual (Australasian) Computer Science Conference, (1994) 55-64; and 1993 ARO/MSI Stony Brook Workshop on Computational Geometry; and International Journal of Computational Geometry and Applications, vol. 7, number 1/2, pp. 5-20, 1997.

Approximating the MaxMin-Angle Covering Triangulation, S. A. Mitchell. Proc. Fifth Canadian Conference on Computational Geometry (1993), 36-41. Also Cornell CS TR92-1327 (thesis) and Computational Geometry: Theory and Applications 7 (1997) 93-111.

Mesh Generation With Provable Quality Bounds, S. A. Mitchell, Applied Math Cornell PhD Thesis, Cornell CS Tech Report TR93-1327 (1993).

Edge-Insertion for Optimal Triangulations, M. Bern, H. Edelsbrunner, D. Eppstein, S. A. Mitchell, and T. S. Tan. Proc. Latin American Theoretical Informatics 1992, 46-60. Also Discrete & Computational Geometry 10:47-65 (1993) Springer-Verlag New York Inc.

Quality Mesh Generation in Three Dimensions, S. A. Mitchell and S. A. Vavasis, Proc. 8th Annual Symposium on Computational Geometry (1992), 212-221. Also developed a two-dimensional implementation at Xerox PARC and presented it at the SUNY Stony Brook Workshop on Computational Geometry, 1991.

Patents & Technical Advances

Hex mesh grafting

Method for Generating a Mesh Representation of a Region Characterized by a Trunk and a Branch Thereon. Inventors: Jason F. Shepherd, Scott A. Mitchell, Steven R. Jankovich, Steven E. Benzley. U.S. Patent No 7,219,039. Issued 15 May 2007. SD-6533.1 S-93,794

All-Hex Geode-Template Mesh Generation and Apparatus, Sandia Technical Advance, SD-6389, 1999. U.S. Patent Rejected.

Hex mesh Whisker Weaving

Connectivity-Based, All-Hexahedral Mesh Generation and Apparatus, Inventors: Timothy James Tautges, Scott A. Mitchell, Ted D. Blacker, Peter Murdoch. U.S. Patent 5,768,156. Issued June 1998.