David O. McLaurin

Curriculum vitae
April 14, 2014
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Education

2010	Ph.D. Deparment of Aerospace Engineering , Mississippi State University. CFD/Meshing/Geometry
2007	B.S. Department of Aerospace Engineering, Mississippi State University.
2007	Minor, Department of Mathematics and Statistics, Mississippi State University.

Appointments

2010 - Present	Assistant Research Professor, HPC^2/CAVS Mississippi State University
2010	Research Associate II, HPC^2/CAVS Mississippi State University

Publications

Refereed Journal Articles

2012	[1] D. McLaurin, D. Marcum, M. Remotigue, and E. Blades. Repairing unstructured triangular mesh intersections. *International Journal for Numerical Methods in Engineering*, 93:266–275, 2013

Refereed Conference Proceedings

2013	[1] D. Thompson, X. Tong, Q. Arnoldus, E. Collins, D. McLaurin, and E. Luke. Discrete surface evolution and mesh deformation for aircraft icing applications. In *Proceedings of 5th Atmospheric and Space Environments Conference*, 2013
	[2] D. McLaurin and S. Shontz. Automated edge grid generation based on arc-length optimization. In *Proceedings of 22nd International Meshing Rountable*, 2013
2012	[3] D. McLaurin. Automated curvature-based edge grid generation. In *Proceedings of AlaSim International Modeling and Simulation Conference*, 2012
	[4] M. Remotigue, D. McLaurin, and D. Marcum. An octree-based offset surface mesh. In *Proceedings of AlaSim International Modeling and Simulation Conference*, 2012

Manuscripts in Submission

2012	[1] D. McLaurin. Discrete edge extension: A new discrete mesh operation. *International Journal for Numerical Methods in Egineering*, 2013

Manuscripts in Preparation

2013 [1] D. McLaurin, J. Dyer, W. Cooke, and C. Moore. Development of a physics-based interpolation procedure for spatial temperature fields. *Journal of Geophysical Research*, 2013

[2] D. McLaurin and S. Bhushan. Physics-based adaptive mesh refinement for hybrid rans/les simulations. *Computers & Fluids*, 2013

[3] D. McLaurin. Discrete edge extension: A new discrete mesh operation. *Computer Aided Geometric Design*, 2013

[4] S. Bhushan and D. McLaurin. Uncertainty quantification methodology for hybrid rans/les simulations. *International Journal of Uncertainty Quantification*, 2013

[5] D. McLaurin and S. Shontz. On surface mesh optimality: Representation deficit as refinement parameter. *Engineering with Computers*, 2013

Web-Based Publications

2012 - Present D. Marcum and D. McLaurin. Aflr3 unstructured grid generator. `http://www.simcenter.msstate.edu/docs/aflr3`, 2013

2010 - Present D. McLaurin, M. Remotigue, and E. Blades. Solidmesh: 3d user's manual. `http://www.simcenter.msstate.edu/docs/solidmesh`, 2013

2008 - Present D. McLaurin, M. Remotigue, and E. Blades. Gridrx: Grid topology repair and feature removal toolkit and library. `http://www.simcenter.msstate.edu/docs/gridrx`, 2010

Thesis

2010 D. McLaurin. Algorithms and methods for discrete mesh repair, 2010. Mississippi State University

Funding

Total:$ 1,710,658, **Principal**:$ 122,524, **Co-PI**: $1,588,134

2013 [1] D. McLaurin, R. Weed, and R. King. Research to develop a framework for grid adaptation and deformation for use in large-scale, high fidelity simulations, 7/1/13-6/30/14. $122,524

[2] R. King, D. McLaurin, E. Topsakal, B. Williams, and T. Thompson. Simbrs wd 50: Tardec high performance computing (hpc) operations improvement, 7/1/12-11/30/12. $119,997

2012 [3] E. Luke, Q. Arnoldus, and D. McLaurin. A comprehensive solid rocket modeling tool, 7/1/12-6/30/24. $261,976

[4] D. Marcum and D. McLaurin. Improvement of robust, production quality unstructured mesh generation, 10/1/12-9/30/13. $105,150

[5] D. Marcum and D. McLaurin. Aflr enhancements, 9/1/12-8/30-13. $121,311

[6] S. Bhushan, D. McLaurin, and B. Cooke. The development of a graphics user interface (gui) based research tool for decision support system for wildfire management and prevention", 10/1/2012-9/30/13. $2,000

2011 [7] D. Marcum, M. Remotigue, and D. McLaurin. Aflr/solidmesh enhancements, pp-cfd-ky03-008-p3, 8/30/11-9/1/12. $176,700

[8] D. Thompson, Luke E., D. Marcum, McLaurin D., and M. Remotigue. Robust meshing for aircraft icing applications, 12/7/11-12/6/14. $501,000

2010 [9] D. Marcum, M. Remotigue, and D. McLaurin. Aflr/solidmesh enhancements, 8/30/10-9/1/11. $125,000

[10] D. Marcum, E. Blades, M. Remotigue, and D. McLaurin. Automated meshing, 8/30/10-9/1/11. $175,000

Awards and Honors

2008-2010 Bagley College of Engineering Fellow

Invited Talks

2011 [1] "Algorithms for Mesh Repair", US Army Engineering Research and Development Center.

[2] "SolidMesh/AFLR3 Training", United States Air Force Base, 2011.

[3] "SolidMesh/AFLR3 Training", Eglin Air Force Base, 2011.

Conference Activity/Participation

2014 [1] D. McLaurin, S. Shontz, and D. Marcum. Multi-core/multi-threaded mesh generation: towards billion element meshes on desktop hardware, 2014. Presented at Minisymposium on "Recent Advances in Parallel Meshing Algorithms" in SIAM Conference on Parallel Processing for Scientific Computing

2013 [2] S. Shontz, D. Colbry, and D. McLaurin. A machine learning tool for automated image segmentation, 2013. Proceedings of Minisymposium "Modeling and Computational Methods for Mathematical Biology and Medicine", Presented at International Conference on Applied Mathematics, Modeling, and Computational Science

[3] D. McLaurin and S. Shontz. Automated edge grid generation based on arc-length optimization. In *Proceedings of 22nd International Meshing Rountable*, 2013

[4] D. Mclaurin and S. Shontz. Optimal mesh generation based on representation deficit, 2013. Presented at Symposium on Mesh Trends IX, 12$^{\text{th}}$ U.S. National Congress on Computational Mechanics (USNCCM12)

[5] S. Bhushan and D. McLaurin. Uncertainty quantification of hybrid RANS/LES simulations using turbulence-length-scale-based adaptive mesh refinement, 2013. Presented at Symposium on Goal-Oriented Error Estimation, 12$^{\text{th}}$ U.S. National Congress on Computational Mechanics (USNCCM12)

[6] S. Shontz and D. Mclaurin. A topology-adaptive level set/mesh deformation technique for boundary evolution tracking: Applications to brain biomechanics, 2013. Presented at Symposium on Geometric Methods for Computational Mechanics, 12th U.S. National Congress on Computational Mechanics (USNCCM12)

2012 [7] D. McLaurin. Automated curvature-based edge grid generation. In *Proceedings of AlaSim International Modeling and Simulation Conference*, 2012

[8] D. McLaurin. Automated discretization of digital curves through local or global constrained optimization. In *NDIA 3170 Physics-Based Modeling in Design and Develop for US Conference*, 2012

[9] A. Shanker, S. Bhushan, and D. McLaurin. Uncertainty quantification for hybrid RANS/LES turbulent simulations, 2012. Presented at 9th Differential Equations and Computational Simulations Conference

Teaching

2013	Convective Heat Transfer
	Computational Geometry
2012	Engineering Analysis
	Intermediate Fluid Mechanics
	Thermodynamics
2011	Heat Transfer
	Thermodynamics

Research/Interests

Computational Fluids, Fluid Mechanics, Turbulence Modeling, Numerical Methods, Fluid-Structure Interaction

Discrete/Differential Geometry, Mesh Generation/Repair, Computational Geometry, Optimal Mesh Generation, Mesh Adaptation/Deformation

Parallel Computing (Multi-core, Shared/Distributed Memory, GPU-Acceleration), High-Performance Computing

Software Development

2013 - Present	Developer, Code Maintenance, UniformCore: Uniform Core mesh generation for large-scale mesh applications, 12,853 lines of C++.
2010 - Present	Developer, Code Maintenance, SolidMesh: is an unstructured grid generation system that is being developed by the ERC Computational Simulation and Design Center (SimCenter) at Mississippi State University (Current Version, 5.10.1), 232,434 lines of C,C++.
2007 - Present	Developer, Code Maintenance, GRX: Grid Topology Repair and Feature Removal Tookit and Library (Current Version, 1.3), 18,401 lines of C,C++.

Service To Profession

2012-Present	Peer Review (7 total articles): International Meshing Roundtable, MSU-UAB Differntial Equations & Computational Simulations Conference

Department/University Service

Masters Students

2012	M. Trcalek. An octree surface wrapping algorithm to recover building structures, 2012. Mississippi State University

Graduate Faculty

2011-Present	Department of Computational Engineering, Level I appointment
2011-Present	Department of Mechanical Engineering, Level II appointment
2011-Present	Department of Aerospace Engineering, Level II appointment

Extracurricular

2012-Present	Faculty Advisor, Women's Club Soccer
2011-Present	Faculty Advisor, Men's Club Soccer
2010-Present	Faculty Advisor, Lambda Chi Alpha Fraternity

Professional Memberships/Affiliations

2010	American Institute of Aeronautics and Astronautics (AIAA)
2011	Institute of Electrical and Electronics Engineers (IEEE)