David O. McLaurin

Curriculum vitae
February 19, 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 et al. "Repairing Unstructured Triangular Mesh Intersections". In: *International Journal for Numerical Methods in Engineering* 93 (3 2013), pp. 266–275

Refereed Conference Proceedings

2013	[1] D. Thompson et al. "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". In: *International Journal for Numerical Methods in Egineering* (2013)

Manuscripts in Preparation

2013

[1] D. McLaurin et al. "Development of a Physics-Based Interpolation Procedure for Spatial Temperature Fields". In: *Journal of Geophysical Research* (2013)

[2] D. McLaurin and S. Bhushan. "Physics-Based Adaptive Mesh Refinement for Hybrid RANS/LES Simulations". In: *Computers & Fluids* (2013)

[3] D. McLaurin. "Discrete Edge Extension: A New Discrete Mesh Operation". In: *Computer Aided Geometric Design* (2013)

[4] S. Bhushan and D. McLaurin. "Uncertainty Quantification Methodology for Hybrid RANS/LES Simulations". In: *International Journal of Uncertainty Quantification* (2013)

[5] D. McLaurin and S. Shontz. "On Surface Mesh Optimality: Representation Deficit as Refinement Parameter". In: *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*. Mississippi State University. 2010

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*. $122,524. 7/1/13-6/30/14

[2] R. King et al. *SimBRS WD 50: TARDEC High Performance Computing (HPC) Operations Improvement*. $119,997. 7/1/12-11/30/12

2012

[3] E. Luke, Q. Arnoldus, and D. McLaurin. *A Comprehensive Solid Rocket Modeling Tool*. $261,976. 7/1/12-6/30/24

[4] D. Marcum and D. McLaurin. *Improvement of Robust, Production Quality Unstructured Mesh Generation*. $105,150. 10/1/12-9/30/13

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

[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"*. $2,000. 10/1/2012-9/30/13

2011 [7] D. Marcum, M. Remotigue, and D. McLaurin. *AFLR/SolidMesh Enhancements, PP-CFD-KY03-008-P3*. $176,700. 8/30/11-9/1/12

[8] D. Thompson et al. *Robust Meshing for Aircraft Icing Applications*. $501,000. 12/7/11-12/6/14

2010 [9] D. Marcum, M. Remotigue, and D. McLaurin. *AFLR/SolidMesh Enhancements*. $125,000. 8/30/10-9/1/11

[10] D. Marcum et al. *Automated Meshing*. $175,000. 8/30/10-9/1/11

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*. Presented at Minisymposium on "Recent Advances in Parallel Meshing Algorithms" in SIAM Conference on Parallel Processing for Scientific Computing. 2014

2013 [2] S. Shontz, D. Colbry, and D. McLaurin. *A Machine Learning Tool for Automated Image Segmentation*. Proceedings of Minisymposium "Modeling and Computational Methods for Mathematical Biology and Medicine", Presented at International Conference on Applied Mathematics, Modeling, and Computational Science. 2013

[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*. Presented at Symposium on Mesh Trends IX, 12$^{\text{th}}$ U.S. National Congress on Computational Mechanics (USNCCM12). 2013

[5] S. Bhushan and D. McLaurin. *Uncertainty Quantification of Hybrid RANS/LES Simulations Using Turbulence-Length-Scale-Based Adaptive Mesh Refinement*. Presented at Symposium on Goal-Oriented Error Estimation, 12$^{\text{th}}$ U.S. National Congress on Computational Mechanics (USNCCM12). 2013

[6] S. Shontz and D. Mclaurin. *A Topology-Adaptive Level Set/mesh Deformation Technique for Boundary Evolution Tracking: Applications to Brain Biomechanics.* Presented at Symposium on Geometric Methods for Computational Mechanics, 12th U.S. National Congress on Computational Mechanics (USNCCM12). 2013

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.* Presented at 9th Differential Equations and Computational Simulations Conference. 2012

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.* Mississippi State University. 2012

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)