

## James C. Newman III

### Education

Ph.D., Mechanical Engineering, Virginia Polytechnic Institute and State University, July 1997  
M.S., Aerospace Engineering, Old Dominion University, May 1994  
B.S., Mechanical Engineering, Old Dominion University, May 1993

### Employment

*Professor, (August 2011 -Present)*

University of Tennessee Chattanooga, Department of Computational Engineering, SimCenter: National Center for Computational Engineering, Chattanooga, TN

*Joint Faculty Appointment, (April 2014 – Present)*

Department of Energy, Oak Ridge National Laboratory, Oak Ridge, TN

*Associate Professor, (July 2002 – August 2011)*

Mississippi State University, Department of Aerospace Engineering, Computational Simulation and Design Center, Engineering Research Center, Mississippi State, MS

*Assistant Professor, (August 1997 -May 2002)*

Mississippi State University, Department of Aerospace Engineering, Computational Simulation and Design Center, Engineering Research Center, Mississippi State, MS

*NASA Fellow/Graduate Research Assistant, (June 1994 July 1997)*

Virginia Polytechnic Institute and State University, Department of Mechanical Engineering, Blacksburg, V A.

*NASA GSRP Fellow, NASA Langley Research Center, Hampton, VA*

*Engineering Consultant, (May 1995 - July 1997)*

Eagle Aeronautics, Inc., Newport News, VA

### Research Areas

Dr. Newman has been active in the areas of multidisciplinary analysis, sensitivity analysis, and computational design optimization since 1994. Prior to this, Dr. Newman's focus area was in the simulation of complex-steady and unsteady moving boundary configurations using both unstructured grid and structured grid domain-decomposition techniques. Dr. Newman has developed software to perform computational fluid-structure, and fluid-thermal, interaction and analysis as well as pioneered new algorithms for evaluating multidisciplinary sensitivity derivatives and for uncertainty analysis. Additionally, he has worked closely with NASA, Navy, DIA/MSIC, and Army researchers to incorporate these techniques into analysis software to provide computational design capabilities, and has utilized them for industrially relevant design solutions.

### Honors and Awards

2002 Office of Naval Research Young Investigator Program Award

1997/2008/2009 IMAGE (Increase Minority Access to Graduate Education) Faculty Award

1994 NASA GSRP (Graduate Student Researcher Program) Fellowship Recipient

1991 NASA LaRSS (Langley Research Summer Scholar) Recipient

### Academic Specialties

*"Methods and Apparatus for a Asymmetrical Fairing,"* U.S. Patent No. 8,157,216. April 17, 2012. Inventors: Thomas Deiters, Tomoya Ochineru, and James C. Newman III.

## Professional Activities

Senior Member, American Institute of Aeronautics and Astronautics (AIAA)

Member, American Society of Mechanical Engineers (ASME)

Member, American Society of Engineering Educators (ASEE)

Pi Tau Sigma (Mechanical Engineering Honorary)

Tau Beta Pi (Engineering Honorary)

## Reviewer

### Archival Journals

AIAA Journal

Journal of Aircraft

International Journal of Computational Fluid Dynamics

International Journal for Numerical Methods in Engineering

Journal of Computers and Fluids

International Journal of Structural and Multidisciplinary Optimization

### Book Reviews John Wiley & Sons

Proposal Reviews National Science Foundation (NSF) Small Business Innovation Research (SBIR) Program (2000, 2003)

### Conference Proceedings

Mississippi State Conference on Differential Equations and Computational Simulation

AIAA Conference Papers

## Refereed Journal Articles

1. Anderson, W.K., Wang, L., Newman III, J.C., and Kapadia, S., "Extension of the Petrov-Garlerkin Time-Domain Algorithm for Dispersive Media," *IEEE Microwave and Wireless Components Letters*, Vol. 23, No. 5, 2013.
2. Blades, E., and Newman III, J.C., "CFD-Based Design Optimization of a Large Payload Fairing," *AIAA Journal of Spacecraft and Rockets*, Vol. 50, No. 5, Sept. 2013.
3. Balasubramanian, R., and Newman III, J.C., "Adjoint-Based Error Estimation and Grid Adaptation for Functional Output: Applications to Two-Dimensional, Inviscid, Incompressible Flows," *Computers & Fluids*, Vol. 38, No. 2, Feb. 2009, pp. 320-332.
4. Yamada, Y., Newman III, J.C., and Newman Jr., J.C., "Elastic-Plastic Finite-Element Analyses of Compression Pre-cracking and Its Influence on Subsequent Fatigue-Crack Growth," *J. of ASTM Int.*, Vol. 5, No.8, Sept. 2008.
5. Balasubramanian, R., and Newman III, J.C., "Comparison of Adjoint Based and Feature Based Grid Adaptation for Functional Outputs," *Int. J. Numer. Meth. Fluids*, Vol 53, No. 10, April 2007, pp. 1541-1569.
6. Balasubramanian, R., and Newman III, J.C., "Discrete Direct and Discrete Adjoint Sensitivity Analysis for Variable Mach Flows," *Int. J. Numer. Meth. Engng.*, Vol. 66, No.2, April 2006, pp. 297-318.
7. Newman III, J.C., Whitfield, D.L., and Anderson, W.K., "A Step-Size Independent Approach for Multidisciplinary Sensitivity Analysis," *J. Aircraft*, Vol. 40, No.3, May-June 2003, pp. 566-573.
8. Burg, C.O.E., and Newman III, J.C., "Computationally Efficient, Numerically Exact Design Space Derivatives via the Complex Taylor's Series Expansion Method," *Computers and Fluids*, Vol. 32, No.3, March 2003, pp. 373-383.
9. Anderson, W.K., Newman III, J.C., Whitfield, D.L., and Nielsen, E. J., "Sensitivity Analysis for the Navier-Stokes Equations on Unstructured Meshes Using Complex Variables," *AIAA J.*, Vol. 39, No.1, Jan. 2000, pp. 56-63.
10. Newman III, J.C., Taylor III, A. C., Barnwell, R.W., Newman, P.A, and Hou, G.J.-W., "Overview of Sensitivity Analysis and Shape Optimization for Complex Aerodynamic Configurations," *J. Aircraft*, Vol. 36, No. 1,1999, pp. 87-96.
11. Newman III, J.C., Newman, P.A, Taylor III, A.C., and Hou, G.J.-W., "Efficient Nonlinear Static Aeroelastic Wing Analysis," *Computers and Fluids*, Vol. 28, Nos. 4-5, May-June 1999, pp. 615-628.
12. Singh, K.P., Newman III, J.C., and Baysal, O., "Dynamic Unstructured Method for Flows Past Multiple Objects in Relative Motion," *AIAA J.*, Vol. 33, No.4, April 1995, pp. 641-649.

## Book Chapters

1. Oloso, A., Taylor III, A.C., and Newman III, J.C., "Aerodynamic Design Optimization Using Advanced CFD Codes," Computational Fluid Dynamics Review 1998 (Eds. M.M. Hafez and K. Oshima), World Scientific Publishing Co., 1998, pp. 560-572.
2. Newman III, J.C., Pankajakshan, R., Whitfield, D.L., and Taylor, L.K., "Computational Hydrodynamic Design Using RANS," Symposium on Naval Hydrodynamics, National Academies Press, 2003, pp. 991-1001.

## Conference Proceedings

1. Liu, C., Newman III, J.C., and Anderson, W.K., "A Streamline/Upwind Petrov Galerkin Overset Grid Scheme for the Navier-Stokes Equations with Moving Domains," *Proceedings of the 32<sup>nd</sup> AIAA Applied Aerodynamics Conference*, AIAA Paper 2014-2980, Atlanta, GA, June 2014.
2. Ahrabi, B.R., Anderson, W.K., and Newman III, J.C., "High-Order Finite-Element Method and Dynamic Adaptation for Two-Dimensional Laminar and Turbulent Navier-Stokes Equations," *Proceedings of the 32<sup>nd</sup> AIAA Applied Aerodynamics Conference*, AIAA Paper 2014-2983, Atlanta, GA, June 2014.
3. Hasbestan, J.J., Newman III, J.C., and Arabshahi, A., "A New Approach to Mesh Adaptation Procedure using Linear Elasticity for Geometries Undergoing Large Displacements," *Proceedings of the 4<sup>th</sup> Joint US-European Fluids Engineering Division Summer Meeting*, FEDSM2014-22010, Chicago, IL, Aug. 2014.
4. Janus, J.M., Newman III, J.C., Ivancic, P., and Luke, E., "Conservative Fluid-Structure Data Transfer Algorithm for Mismatched-Mesh Simulations," *Proceedings of the 21<sup>st</sup> AIAA Computational Fluid Dynamics Conference*, San Diego, CA, June 2013.
5. Kapadia, S., Anderson, W.K., Newman III, J.C., "Computational Analysis and Design of Solid Oxide Fuel Cells," *ASME 10<sup>th</sup> International Fuel Cell Science, Engineering & Technology Conference*, San Diego, CA, July 2012.
6. Ochineru, T., Deiters, T., Higgins, J.E., Blades, E., and Newman III, J.C., "Design and Testing of a Large Composite Asymmetric Payload Fairing," *Proceedings of the 50<sup>th</sup> AIAA/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, AIAA Paper 09-2696, Palm Springs, CA, May 2009.
7. Burgreen, G.W., and Newman III, J.C., "Robust Simulation of CFD-Predicted Hemolysis," *NIH/FDA/NSF Computational Modeling for Cardiovascular Devices Meeting Proceedings*, Rockville, MD, June 2009
8. Yamada, Y., Newman III, J.C., and Newman Jr., J.C., "Elastic-Plastic Finite-Element Analysis of Compression Pre cracking and Its Influence on Subsequent Fatigue-Crack-Growth Behavior," *Proceedings of the 7<sup>th</sup> International ASTM/ESIS Symp. on Fatigue and Fracture*, Tampa, FL, Nov. 2007.
9. Newman III, J.C., and Blades, E.L., "Parallel Optimization Strategy for Large-Scale Computational Design," *Proceedings of the 3<sup>rd</sup> AIAA Multidisciplinary Design Optimization Specialists Conference*, AIAA Paper 071930, Waikiki, HI, April 2007.
10. Blades, E.L., and Newman III, J.C., "Aeroelastic Effects of Spinning Missiles," *Proceedings of the 48<sup>th</sup> AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics, and Materials Conference*, AIAA Paper 072243, Waikiki, HI, April 2007.
11. Blades, E.L., and Newman III, J.C., "Computational Aeroelastic Analysis of an Unmanned Aerial Vehicle using U<sup>2</sup>NCLE," *Proceedings of the AIAA Dynamics Specialists Conference*, AIAA Paper 07-2237, Waikiki, HI, April 2007.
12. Balasubramanian, R., and Newman III, J.C., "Comparison of Adjoint-based and Feature-based Grid Adaptation for Functional Outputs," *Proceedings of the 36<sup>th</sup> AIAA Fluid Dynamics Conference and Exhibit*, AIAA Paper 06-3314, San Francisco, CA, June 2006.
13. Groner III, B.J., Lee, M.A., Moorhead, R.J., Martin, J.P., Newman III, J.C., "Concurrent Visualization of a Parallelized Computational Fluid Dynamics Code," *International Society for Modeling and Simulation, HPC Spring Simulation Multiconference*, Huntsville, AL, April 2006.
14. Groner, J., Lee, M., Martin, J., Moorhead, R. J., and Newman III, J.C., "A Concurrent Visualization System for High-Performance Computational Simulations," *IEEE Visualization 2005 Proceedings Compendium*, March 2005.
15. Balasubramanian, R., and Newman III, J.C., "Discrete Direct and Discrete Adjoint Sensitivity Analysis for Arbitrary Mach Number Flows," *SIAM Conference on Computational Science and Engineering*, Orlando, FL, February 2005.
16. Brewer, W.H., Newman III, J.C., and Burgreen, G.W., "Computational Design of Propulsors For Improved Cavitation Performance," *Bound Proceedings of the 8<sup>th</sup> International Conference on Numerical Ship Hydrodynamics*, Busan, Korea, September 2003.
17. Burg, C.O.E., Sheng, C., Newman III, J.C., Brewer, W.H., Blades, E., and Marcum, D.L., "Verification and Validation of Forces Generated by an Unstructured Flow Solver," *Bound Proceedings of the 16<sup>th</sup> Computational Fluid Dynamics Conference*, AIAA Paper 03-3983, Orlando, FL, June 2003.
18. Newman III, J.C., Pankajakshan, R., Whitfield, D.L., and Taylor, L.K., "Computational Design Using RANS," *Bound Proceedings of the 24<sup>th</sup> Symposium on Naval Hydrodynamics*, Fukuoka, Japan. July 2002.
19. Janus, J.M., and Newman III, J.C., "Aerodynamic and Thermal Design Optimization for Turbine Airfoils," *Proceedings of the 38<sup>th</sup> Aerospace Sciences Meeting & Exhibit*, AIAA Paper 00-0840, Reno, NV, January 2000.
20. Newman III, J.C., Whitfield, D.L., and Anderson, W.K., "A Step-Size Independent Approach for Multidisciplinary Sensitivity Derivatives," *Bound Proceedings of the 17<sup>th</sup> Applied Aerodynamics Conference*, Vol. 1, pp. 1-12, AIAA Paper 99-3101, June 1999.
21. Anderson, W.K., Newman III, J.C., Whitfield, D.L., and Nielsen, E.J., "Sensitivity Analysis for the Navier-Stokes Equations on Unstructured Meshes Using Complex Variables," *Bound Proceedings of the 14<sup>th</sup> Computational Fluid Dynamics Conference*, Vol. 1, pp. 381-389, AIAA Paper 99-3294, June 1999.
22. Newman III, J.C., Taylor III, A.C., and Barnwell, R.W., "Aerodynamic Shape Sensitivity Analysis and Design

- Optimization of Complex Configurations Using Unstructured Grids,” *Bound Proceedings of the 15<sup>th</sup> Applied Aerodynamics Conference*, Vol. 1, pp. 420-431, AIAA Paper 97-2275, June 1997.
23. Taylor III, A.C., Oloso, A., and Newman III, J.C., “CFL3D.ADII (Version 2.0): An Efficient, Accurate, General-Purpose Code for Flow Shape-Sensitivity Analysis,” *Bound Proceedings of the 15<sup>th</sup> Applied Aerodynamics Conference*, Vol. 1, pp. 188-197, AIAA Paper 97-2204, June 1997.
  24. Newman III, J.C., Newman, P.A., Taylor III, A.C., and Hou, G.J.-W., “Nonlinear Aerodynamic Design Optimization of a Flexible Wing,” *Bound Proceedings of the 6<sup>th</sup> AIAA/NASA/USAF Multidisciplinary Analysis and Optimization Symposium*, Vol. 2, pp. 36-46, AIAA Paper 96-4108, September 1996.
  25. Newman III, J.C., and Taylor III, A.C., “Three-Dimensional Aerodynamic Shape Sensitivity Analysis and Design Optimization Using the Euler Equations on Unstructured Grids,” *Bound Proceedings of the 14<sup>th</sup> Applied Aerodynamics Conference*, Vol. 1, pp. 177-189, AIAA Paper 96-2464, June 1996.
  26. Newman III, J.C., Taylor III, A.C., and Burgreen, G.W., “An Unstructured Grid Approach to Sensitivity Analysis and Shape Optimization Using the Euler Equations,” *Bound Proceedings of the 12<sup>th</sup> Computational Fluid Dynamics Conference*, Vol. 1, pp. 69-80, AIAA Paper 95-1646, June 1995.
  27. Singh, K.P., Newman III, J.C., and Baysal, O., “Dynamic Unstructured Method for Flows Past Multiple Objects in Relative Motion,” *Proceedings of the 32<sup>nd</sup> Aerospace Sciences Meeting & Exhibit*, AIAA Paper 94-0058, Reno, NV, January 1994.
  28. Newman III, J.C., and Baysal, O., “Transonic Solutions of a Wing/Pylon/Finned Store Using Hybrid Domain Decomposition,” *Bound Proceedings of the 38<sup>th</sup> Atmospheric Flight Mechanics Conference*, Vol. 1, pp. 441450, AIAA Paper 92-4571, August 1992.
  29. Fouladi, K., Baysal, O., and Newman III, J.C., “Hybrid Domain Decomposition for Configurations with Multiple Non-Similar Components,” *Bound Proceedings of the 5<sup>th</sup> SIAM Conference on Domain Decomposition Methods for Partial Differential Equations*, May 1991.

### Reports (unrestricted list)

1. Thompson, D., Luke, E., Newman III, J.C., Janus, J.M., Tong, X., and Moore, C., “Development of a Strategy for Simulating Blast-Vehicle Interaction,” U.S. Army RDECOM-TARDEC Contract W56HZV-08-C-0126, Final Report, Sept. 2010.
2. Marcum, D., Newman III, J.C., Thompson, D., Blades, E. L., Walters, K., and Hughson, M., “Enhanced Computational Aerodynamic Analysis: Volumes 1 to 4,” MSSU-BCoE-HPC2-06-04, April 2006. (also Final Contract Report, Defense Intelligence Agency/Missile and Space Intelligence Center).
3. Newman III, J.C., “A New Approach for Discrete Sensitivity Analysis Using Complex Variables,” MSU Report, MSSU-COE-ERC-04-09, September 2004.
4. Newman III, J.C., “Matrix Inversion by the Complex Taylor Series Expansion Method with Application to Discrete-Adjoint Sensitivity Analysis,” MSU Report, MSSU-COE-ERC-04-08, September 2004.
5. Marcum, D.L., Newman III, J.C., Burg, C.O.E., Burgreen, G.W., Sheng, C., Blades, E., Remotigue, M., and Brewer, W., “Computational Engineering Research Supporting the Analysis and Design of Marine and Aerospace Vehicles,” MSU Report, MSSU-COE-ERC-04-08, June 2004. (also Final Report, Office of Naval Research)
6. Sheng, C., Newman III, J.C., Remotigue, M., Chen, J.P., Marcum, D.L., and Whitfield, D.L., “Development of Unstructured Computational Capabilities Applicable to MSU TURBO with an Arbitrary Mach Number Algorithm,” MSU Report, MSSU-COE-ERC-02-16, October 2002.
7. *Computational Simulation and Design Center Staff*, “Computational Engineering Research Supporting the Analysis and Design of Marine and Aerospace Vehicles,” MSU Report, MSSU-COE-ERC-02-09, May 2002. (also Final Report, Office of Naval Research)
8. Newman III, J.C., and Whitfield, D.L., “Sensitivity Derivative Analysis for Use in Computational Design Optimization,” Final Report, Lockheed Martin Aeronautical Systems, March 2001. (modified for external release as MSU Report MSSU-COE-ERC-01-06, September 2001).
9. Newman III, J.C., “Aero-Structural Interaction, Analysis, and Shape Sensitivity,” Final Report, NASA Langley Research Center, Jan. 2000.
10. Newman III, J.C., Anderson, W.K., and Whitfield, D.L., “Multidisciplinary Sensitivity Derivatives Using Complex Variables,” MSU Report, MSSU-COE-ERC-98-08, July 1998.

### Dissertation/Thesis

1. Newman III, J.C., “Integrated Multidisciplinary Design Optimization Using Discrete Sensitivity Derivatives for Geometrically Complex Aeroelastic Configurations,” PhD Dissertation, Virginia Polytechnic Institute and State University, July 1997.
2. Newman III, J.C., “Flow Simulations About Steady-Complex and Unsteady Moving Configurations Using Structured-Overlapped and Unstructured Grids,” MS Thesis, Old Dominion University, May 1994.