

STEVEN E. GORRELL

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Research Interests

Experimental and Computational Fluid Dynamics
Turbomachinery
Design Space Exploration
Engineering Education

Education

Ph.D., Iowa State University, *Mechanical Engineering*, December 2001.

Dissertation: *An Experimental and Numerical Investigation of Stator-Rotor Interactions in a Transonic Compressor.*

Chair: Theodore Okiishi.

M.S., Virginia Tech, *Mechanical Engineering*, May 1990.

Thesis: *An Experimental Investigation of Rotating Stall Axial Mach Number Distributions at the Exit of a High-Speed, Multistage Compressor.*

Chair: Walter O'Brien.

B.S., Brigham Young University, *Mechanical Engineering*, April 1988.

Experience

Professor, August 2020–Present

Associate Professor, August 2007–August 2020

Brigham Young University, Provo, UT

Research focus on experimental and computational fluid dynamics, turbomachinery, computational science and engineering, and engineering education.

Faculty Search Committee, College Research Proposal Review Committee, ASME student section Advisor,

Courses taught: Applications of Fluid Dynamics, Turbulence, Compressible Flow, Gas Turbine and Jet Engine Design, Computational Fluid Dynamics and Heat Transfer, Fluid Mechanics, Aerospace Partners for the Advancement of Collaborative Engineering (AerosPACE).

Air Force Office of Scientific Research Summer Faculty Fellowship Program, 2013.

Air Force Research Laboratory, Wright-Patterson Air Force Base. Conducted research on inlet-fan interaction.

Senior Aerospace Engineer, 2006–2007

Air Force Research Laboratory, Propulsion Directorate, Fan and Compressor Branch,
Wright-Patterson AFB, OH

Led government, industry, and academia team to use high performance computing to investigate unsteady aerodynamics in advanced military gas turbine engine fans and compressors. Pioneered the simulation of distortion transfer and generation through fans.

Managed the Versatile Affordable Advanced Turbine Engine Adaptive Cycle Fan program.

Aerospace Engineer, 1989–2006

Air Force Research Laboratory, Propulsion Directorate, Experimental Evaluation Branch and Fan and Compressor Branch, Wright-Patterson AFB, OH

Principal Investigator for in-house research program to study effects of blade-row interactions on transonic fans and compressors using high-fidelity particle image velocimetry measurements and time-accurate computational fluid dynamics simulations.

Managed General Electric Aircraft advanced core compressor program.

Publications

Journal Publications

* designates a student

1. Bird, G. D.*, Gorrell, S. E., and Salmon, J. L., “Dimensionality-Reduction-Based Surrogate Models for Real-time Design Space Exploration of a Jet Engine Compressor Blade,” *Aerospace Science and Technology*, Vol. 118, 107077, November 2021. Published online 27 August 2021.
2. Thelin, C.*, Bunnell, S.*, Gorrell, S., Wright, L.*, and Salmon, J., “Spatially defined optimization of FEA using nodal surrogate models,” *Structural and Multidisciplinary Optimization*, Vol. 64, issue 2, pp. 813–828, August 2021.
3. Bunnell, S.*, Gorrell, S., and Salmon, J., “Design Space Exploration of Rotor Blades Accounting for Vibratory Responses by Indirect Emulation,” *ASME Journal of Computing and Information Science in Engineering*, Vol. 21, 041001, August 2021.
4. Thelin, C.*, Salmon, J., Gorrell, S., Bunnell, S.*, Bird, G.*, Ruoti, C., Selin, E., and Calogero, J., “Using Surrogate Models to Predict Nodal Results for Fatigue Risk Analysis,” *International Journal of Fatigue*, Vol. 146, 106039, May 2021.
5. Bunnell, S.*, Gorrell, S., and Salmon, J., “Multi-Fidelity Surrogates from Shared Principal Components,” *Structural and Multidisciplinary Optimization*, Vol. 63, issue 5, pp. 2177–2190, May 2021.
6. Fernelius, M. H.* and Gorrell, S. E., “Design of a Pulsing Flow Driven Turbine,” *ASME Journal of Fluids Engineering*, Vol. 143, 041501, April 2021.
7. Bunnell, S.*, Gorrell, S., Salmon, J., Thelin, C.*, and Ruoti, C., “Structural Design Space Exploration Using Principal Component Analysis,” *ASME Journal of Computing and Information Science in Engineering*, Vol. 20, 061014, December 2020.

8. Fernelius, M. H.* and Gorrell, S. E., “Mapping Efficiency of a Pulsing Flow Driven Turbine,” *ASME Journal of Fluids Engineering*, Vol. 142, 061202, June 2020.
9. Fanning, D. T.*, Gorrell, S. E., Maynes, R. D., and Oliphant, K., “Contributions of Tip Leakage and Inlet Diffusion on Inducer Backflow,” *ASME Journal of Fluids Engineering*, Vol. 141, 121102, December 2019.
10. Thelin, C.*, Bunnell, S.*, Salmon, J., and Gorrell, S., “Difference Modeling for Design Space Exploration and Comparison of 3D Structural Simulation Results,” *Information Visualization*, Vol. 18, No. 4, pp. 455–470, October 2019.
11. Lundgreen, R.*, Maynes, D., Gorrell, S., and Oliphant, K., “Increasing Inducer Stability and Suction Performance with a Stability Control Device,” *ASME Journal of Fluids Engineering*, Vol. 141, 011204, January 2019.
12. Stone, B.*, Salmon, J., Hepworth, A., Gorrell, S., and Richey, M., “Improving Virtual Design Team Performance Through Use of a Collaborative Sketching Application,” *International Journal of e-Collaboration*, Vol. 13, Issue 4, October–December, 2018.
13. Stone, B.*, Wald, M.*, Gorrell, S., and Richey, M., “Collaboration Task–Technology Fit for Student Distributed Engineering Design Teams,” *International Journal of Engineering Education*, Vol. 34, No. 5, pp. 1687–1700, 2018.
14. Stone, B.*, Gorrell, S. and Richey, M., “Profile-Based Team Organization in Multi-University Capstone Engineering Design Teams,” *International Journal of Engineering Education*, Vol. 34, No. 2(A), pp. 414–429, 2018.
15. Stone, B.*, Salmon, J., Eves, K.*, Killian, N.*, Wright, L.*, Oldroyd, J.*, Gorrell, S., and Richey, M., “A Multi-User Computer-Aided Design Competition: Experimental Findings and Analysis of Team-Member Dynamics,” *ASME Journal of Computing and Information Science in Engineering*, Vol. 17, 031003, September 2017.
16. Blanc, T. J.*, Jones, M. R., and Gorrell, S. E., “Reduced-Order Modeling of Conjugate Heat Transfer Processes,” *ASME Journal of Heat Transfer*, Vol. 138, 051703, May 2016.
17. Clark, K. P.* and Gorrell, S. E., “Analysis and Prediction of Shock-Induced Vortex Circulation in Transonic Compressors,” *ASME Journal of Turbomachinery*, Vol. 137, 121007, December 2015.
18. Reynolds, S. B.*, Gorrell, S. E., and Estevadeordal, J., “PIV Analysis on the Effect of Stator Loading on Transonic Blade-Row Interactions,” *ASME Journal of Turbomachinery*, Vol. 134, 061012, November 2012.
19. Turner, M. G., Gorrell, S. E., and Car, D., “Radial Migration of Shed Vortices in a Transonic Rotor Following a Wake Generator: A Comparison Between Time Accurate and Average Passage Approaches,” *ASME Journal of Turbomachinery*, Vol. 133, 031018, July 2011.
20. S. Chandra*, A. Lee*, S. Gorrell and C. G. Jensen, “CFD Analysis of PACE Formula-1 Car,” *Computer-Aided Design and Applications*, PACE(1), pp. 1–14, 2011.

21. Nolan, S. P. R.*, Botros, B. B.*, Tan, C., Adamczyk, J. A., Greitzer, E. M., and Gorrell, S. E., "Effects of Upstream Wake Phasing on Transonic Axial Compressor Performance," *ASME Journal of Turbomachinery*, Vol. 133, 021010, April 2011.
22. Yao, J., Gorrell, S. E., and Wadia, A. R., "High-Fidelity Numerical Analysis of Per-Rev-Type Inlet Distortion Transfer in Multistage Fans - Part II: Entire Component Simulation and Investigation," *ASME Journal of Turbomachinery*, Vol. 132, 041015, October 2010.
23. Yao, J., Gorrell, S. E., and Wadia, A. R., "High-Fidelity Numerical Analysis of Per-Rev-Type Inlet Distortion Transfer in Multistage Fans - Part I: Simulations with Selected Blade Rows," *ASME Journal of Turbomachinery*, Vol. 132, 041014, October 2010.
24. C-H Cho, S-Y Cho., S E Gorrell, K-Y Ahn, and Y-C Kim, "An Inverse Design of a Double-Pitch Passage for an Infinite Cascade Model Experiment," *Proc. IMechE, Part C: J. Mechanical Engineering Science*, 2010, 224(C1), 157-168. DOI: 10.1243/09544062JMES1552.
25. List, M. G.*, Gorrell, S. E., Turner, M. G., "Investigation of Loss Generation in an Embedded Transonic Fan Stage at Several Gaps Using High Fidelity, Time-Accurate CFD," *ASME Journal of Turbomachinery*, Vol. 132, 011014, January 2010.
26. Gorrell, S. E., van de Wall, A., and Tsung, F., "Understanding Unsteady Flow Features in Transonic Compressors," *Computing in Science and Engineering*, Vol. 9, No.6 , pp. 12–17, November/December 2007.
27. Estevadeordal, J., Gorrell, S. E., and Copenhaver, W. W., "PIV Study of Wake-Rotor Interactions in a Transonic Compressor at Various Operating Conditions," *AIAA Journal of Propulsion and Power*, Vol. 23, No. 1, pp. 235–242, January - February 2007.
28. Gorrell, S. E., Car, D., Puterbaugh, S. L., Estevadeordal, J., and Okiishi, T. H., "An Investigation of Wake-Shock Interactions in a Transonic Compressor with Digital Particle Image Velocimetry and Time-Accurate Computational Fluid Dynamics," *ASME Journal of Turbomachinery*, Vol. 128, pp. 616–626, October 2006.
29. Gorrell, S. E., Okiishi, T. H., and Copenhaver, W. W., "Stator Rotor Interactions in Transonic Compressor: Part 2 - Description of a Loss Producing Mechanism," *ASME Journal of Turbomachinery*, Vol. 125, pp. 336–345, April 2003.
30. Gorrell, S. E., Okiishi, T. H., and Copenhaver, W. W., "Stator Rotor Interactions in Transonic Compressor: Part 1 - Effect of Blade-Row Spacing on Performance," *ASME Journal of Turbomachinery*, Vol. 125, pp. 328–335, April 2003.
31. Copenhaver, W., Estevadeordal, J., Gogineni, S., Gorrell, S., and Goss, L., "DPIV Study of Near-Stall Wake-Rotor Interactions in a Transonic Compressor," *Experiments in Fluids*, Vol. 33, pp. 899–908, December 2002.
32. Estevadeordal, J., Gogineni, S., Goss, L., Copenhaver, W. and Gorrell, S., "Study of Wake-Blade Interactions in a Transonic Compressor Using Flow Visualization and DPIV," *ASME Journal of Fluids Engineering*, Vol. 124, pp. 166–175, March 2002.

33. Gorrell, S. E., Copenhaver, W. W. and Chriss, R. M., “Upstream Wake Influences on the Measured Performance of a Transonic Compressor Stage,” *AIAA Journal of Propulsion and Power*, Vol. 17, pp. 43–48, January/February 2001.

Manuscripts Accepted to Archival Journals

Lundgreen, R.*, Maynes, D., Gorrell, S., and Oliphant, K., “Geometry Variations of an Inlet Cover Bleed System for an Axial Pump,” *ASME Journal of Fluids Engineering*. Accepted.

Manuscripts in Edited Books

Mortensen, C.*, Gorrell, S., Woodley, R., and Gosnell, M., “Data Mining Vortex Cores Concurrent with Computational Fluid Dynamics Simulations,” *Real World Data Mining Applications*, Annals of Information Systems, Vol. 17, Abou-Nasr M., Lessmann, S., Stahlbock, R., and Weiss, G.M. (eds.), ISBN: 978 – 3 – 319 – 07812 – 0_1, Springer, 2015.

Gorrell, S. E., Copenhaver, W. W., and Estevadeordal, J., “DPIV Measurements of the Flow Field between a Transonic Rotor and an Upstream Stator,” in *Unsteady Aerodynamics, Aeroacoustics and Aeroelasticity of Turbomachines*, K. C. Hall, R. E. Kielb and J. P. Thomas, Eds. Springer, 2006.

Peer-Reviewed Technical Papers and Conference Proceedings

1. Orme, A. D.*, Pulsipher, A. C.*, and Gorrell, S. E., “Effects of Inlet Distortion Patterns on Induced Swirl in a Highly Loaded Fan Stage,” *Proceeding of ASME Turbo Expo 2020, Paper GT 2020-15686*, June, 2020.
2. Soderquist, D.*, Orme, A.*, Gorrell, S., and List, M., “Radial Variation in Distortion Transfer and Generation Through a Highly Loaded Fan Stage from Near-Stall to Choke,” *Proceedings of ASME Turbo Expo 2019, Paper GT2019-91753*, June, 2019.
3. Soderquist, D.*, Gorrell, S., and List, M., “Radial Variation in Distortion Transfer and Generation Through a Highly Loaded Fan Stage,” *Proceedings of ASME Turbo Expo 2018, Paper GT2018-77221*, June, 2018.
4. Bunnell, S.*, Thelin, C.*, Gorrell, S., Salmon, J., Ruoti, C., and Hepworth, A., “Rapid Visualization of Compressor Blade Finite Element Models Using Surrogate Modeling,” *Proceedings of ASME Turbo Expo 2018, Paper GT2018-77188*, June, 2018.
5. Peterson, M. W.*, Gorrell, S. E., and List, M. G., “Fourier Descriptors for Improved Analysis of Distortion Transfer and Generation,” *Proceedings of ASME Turbo Expo 2017, Paper GT2017-65031*, June, 2017.
6. Fernelius, M. H.*, and Gorrell, S. E., “Predicting Efficiency of a Turbine Driven by Pulsing Flow,” *Proceedings of ASME Turbo Expo 2017, Paper GT2017-63490*, June, 2017.

7. Fanning, D. T.*, Lundgreen, R. K.*, Maynes, R. D., Gorrell, S. E., and Oliphant, K., "Numerical Study of the Effects of Tip Clearance and Inlet Diffusion on Inducer Back-flow," *Proceedings of the 2nd Thermal and Fluid Engineering Conference, Paper TFEC-IWHT2017-17566*, April, 2017.
8. Spencer, R. A.*, Gorrell, S. E., Jones, M. R., and Duque, E. P. N., "Analysis and Comparison of Clean vs Inlet Distortion Flow Physics at Design Operating Condition Using Proper Orthogonal Decomposition," *Proceedings of ASME Turbo Expo 2015, Paper GT2015-42720*, June, 2015
9. Weston, D. B.*, Gorrell, S. E., Marshall, M. W.*, and Wallis, C. V., "Analysis of Turbofan Performance Under Total Pressure Distortion at Various Operating Points," *Proceedings of ASME Turbo Expo 2015, Paper GT2015-42879*, June, 2015.
10. Lundgreen, R.*, Maynes, D., Gorrell, S., and Oliphant, K., "Influence of a Stability Control Device on the Performance of a Cavitating Water Pump Inducer," *Proceedings the ASME 2014 4th Joint US-European Fluids Engineering Meeting Summer Meeting, Paper FEDSM2014-21138*, August, 2014.
11. Gorrell, S., Jensen, C. G., Stone, B.*, Red, E., Richey, M., Zender, F., Wright, M., French, D., Hayashibara, S., Johnson, C., and Sullivan, J., "Aerospace Partners for the Advancement of Collaborative Engineering (AerosPACE)," *121st ASEE Annual Conference and Exposition*, Paper ID #9767, June, 2014.
12. Blanc, T. J.*, Jones, M. R., Gorrell, S. E., and Duque, E. P. N., "Reduced Order Modeling and Compression of Data Produced by Simulations of Transient and Periodic Heat Transfer Processes," *Proceedings of the ASME 2013 Summer Heat Transfer Conference, Paper HT2013-17604*, July, 2013.
13. Gosnell M. R., Woodley, R. S., and Gorrell, S. E., "Results of Mining Data Features During Computational Fluid Dynamics Simulations," *Proceedings of the 2012 International Conference on Data Mining*, July, 2012.
14. McQuay, S. M.* and Gorrell, S. E., "N-th-order Accurate, Distributed Interpolation Library", *Proceedings of the 10th Python in Science Conference*, July, 2011. <https://doi.org/10.25080/Majora-ebaa42b7-010>
15. Clark, K. P.* and Gorrell, S. E., "The Effects of Blade Loading on Trailing Edge Vortex Formation on a Highly Loaded Stator Upstream of a Transonic Rotor," *ASME Paper GT2011-45891*, June 2011.
16. Packard, N. O.*, Maynes, R. D., Japikse, D., and Gorrell, S. E., "Numerical Characterization of the Inlet Flow for Eleven Turbomachines," *ASME Paper GT2010-22366*, June 2010.
17. Mortensen, C. H.*, Woodley, R. S., and Gorrell, S. E., "Concurrent Agent-enabled Extraction of Computational Fluid Dynamics (CFD) Features in Simulation," *Proceedings of the 2009 International Conference on Data Mining*, July, 2009.

18. Chriss, R. M., Copenhaver, W. W. and Gorrell, S. E., "The Effects of Blade-Row Spacing on the Flow Capacity of a Transonic Rotor," *ASME Paper 99-GT-209*, June 1999.
19. Gorrell, S. E. and Russler, P. M., "Stall Inception in a High-Speed Low Aspect Ratio Fan Including the Effects of Casing Treatments," *ASME paper 94-GT-322*, June 1994.

Peer Reviewed Abstracts and Other Papers

1. Bedke, A. M.*, and Gorrell, S. E., "The Effects of Various Inlet Distortion Patterns on Distortion Transfer and Generation in a Transonic Fan at Various Operating Points," *Proceedings of the 2021 AIAA Propulsion and Energy Forum, Paper 2021-3465*, August, 2021.
2. Orme, A. D.*, Soderquist, D. R.*, and Gorrell, S. E., "Analysis of Distortion Phase Shift in a Highly Loaded Fan Stage," *Proceedings of the 2020 AIAA SciTech Forum, Paper 2020-0132*, January, 2020.
3. Unrau, M. A.*, and Gorrell, S. E., "Simulating Stall Inception in a High Performance Fan Using CREATE-AV Kestrel," *Proceedings of the 2019 AIAA Aerospace Sciences Meeting, Paper 2019-1109*, January, 2019.
4. Soderquist, D. R.*, Gorrell, S. E., and Custer, C. H., "Analysis of Distortion Transfer and Generation through a Compressor Using the Harmonic Balance Approach," *Proceedings of the 2018 AIAA Aerospace Sciences Meeting, Paper 2018-1354*, January, 2018.
5. Unrau, M. A.*, and Gorrell, S. E., "Mixing Plane Simulation of a High-Performance Fan Using Kestrel," *Proceedings of the 2018 AIAA Aerospace Sciences Meeting, Paper 2018-1510*, January, 2018.
6. Fernelius, M.*, and Gorrell, S., "Experimental Analysis of an Axial Turbine Driven by Periodic Pressure Pulses," *Proceedings of the 2016 AIAA/SAE/ASEE Joint Propulsion Conference, Paper 2016-4742*, July, 2016.
7. Peterson, M. W.*, Gorrell, S. E., and List, M. G., "Implementation of Fourier Methods in CFD to Analyze Distortion Transfer and Generation Through a Transonic Fan," *Proceedings of the 2016 AIAA/SAE/ASEE Joint Propulsion Conference, Paper 2016-4746*, July, 2016.
8. Lundgreen, R. K.*, Oliphant, K. N., Maynes, R. D., and Gorrell, S. E., "High Suction Performance Pumps with Large Inlet Blade Angles and an Integrated Stability Control Device," *Proceedings of the 2016 AIAA/SAE/ASEE Joint Propulsion Conference, Paper 2016-4985*, July, 2016.
9. Spencer, R. A.*, Gorrell, S. E., Jones, M. R., and Duque, E. P. N., "Analysis and Comparison of Inlet Distortion Flow Physics at Design and Near Stall Operating Condition Using Proper Orthogonal Decomposition," *Proceedings of the 2016 AIAA/SAE/ASEE Joint Propulsion Conference, Paper 2016-5058*, July, 2016.

10. Wald, M. O.*, Gorrell, S. E., Richey, M., Zender, F., Chang, K., and Vander Wel, M., "Aerospace Partners for the Advancement of Collaborative Engineering, a Review," *Proceedings of the 2016 AIAA Aviation Technology, Integration, and Operations Conference*, Paper 2016-3462, June, 2016.
11. Duque, E. P. N., Hiepler, D. E., Haimes, R., Stone, C. P., Gorrell, S. E., Jones, M. R., and Spencer, R. A.*, "EPIC An Extract Plug-In Components Toolkit for In situ Data Extracts Architecture," *Proceedings of the 2015 AIAA Computational Fluid Dynamics Conference*, Paper 2015-3410, June, 2015.
12. Becar, J. S.*, and Gorrell, S. E., "A Collaborative Conceptual Aircraft Design Environment for the Design of Small-Scale UAVs in a Multi-University Setting," *Proceedings of the 2015 AIAA Aerospace Sciences Meeting*, Paper 2015-1515, January, 2015.
13. Duque, E. P. N., Hiepler, D. E., Gorrell, S. E., Jones, M. R., and Blanc, T. J.*, "Visualization and Post-Processing of Large Scale Engineering Applications Using Proper Orthogonal Decomposition," *Proceedings of the 2015 AIAA Aerospace Sciences Meeting*, Paper 2015-1366, January, 2015.
14. Fernelius, M.*, and Gorrell, S., "Thermocouple Recovery Factor for Temperature Measurements in Turbomachinery Test Facilities," *Proceedings of the 2014 AIAA Aerospace Sciences Meeting*, Paper 2014-0791, January, 2014.
15. Cluff, R.*, Lundgreen, R.*, Gorrell, S. E., Maynes, R. D., and Oliphant, K. ., "A Comparison of three-bladed and four-bladed Inducers at On and Off Design Flow Rates," *Proceedings of the 2013 AIAA Joint Propulsion Conference*, Paper 2013-3761, July, 2013.
16. Johnson, J. J.*, Copenhaver, W. W., and Gorrell, S. E., "The Effects of Freestream Turbulence on Serpentine Diffuser Distortion Patterns," *Proceedings of the 2013 AIAA Joint Propulsion Conference*, Paper 2013-3953, July, 2013.
17. Marshall, M. L.*, Weston, D. B.*, Gorrell, S. E., and Wallis, C. V., "Validation of a Modified Version of OVERFLOW 2.2 for use with Turbomachinery," *Proceedings of the 2013 AIAA Joint Propulsion Conference*, Paper 2013-3626, July, 2013.
18. Blanc, T. J.*, Gorrell, S. E., Jones, M. R., and Duque, E. P. N., "Analysis and Compression of Time-Accurate Turbomachinery Simulations Using Proper Orthogonal Decomposition," *Proceedings of the 2013 AIAA Joint Propulsion Conference*, Paper 2013-3620, July, 2013.
19. Fernelius, M. H.*, Gorrell, S. E., Hoke, J. L., and Schauer, F. R., "Effect of Periodic Pressure Pulses on Axial Turbine Performance," *Proceedings of the 2013 AIAA Joint Propulsion Conference*, Paper 2013-3687, July, 2013.
20. Zender, F.*, Schrage, D., Richey, M., Black, A.*, Sullivan, J., Gorrell, S., and Jensen, C. G., "Wing Design as a Symphony of Geographically Dispersed, Multi-disciplinary, Undergraduate Students," *Proceedings of the 2013 AIAA Structures, Structural Dynamics, and Materials Conference*, Paper 2013-1503, April, 2013.

21. Fernelius, M. H.*, Gorrell, S. E., Hoke, J. L., and Schauer, F. R., "Design and Fabrication of an Experimental Test Facility to Compare the Performance of Pulsed and Steady Flow through a Turbine," *Proceedings of the 2013 AIAA Aerospace Sciences Meeting, Paper 2013-0277*, January, 2013.
22. Shaw, R. P.*, Gorrell, S. E., Woodley, R. S., and Gosnell, M. R., "Vortex Core Line Extraction and Tracking from Unsteady Computational Fluid Dynamics Simulations Using Subjective Logic," *Proceedings of the 2012 AIAA Aerospace Sciences Meeting, Paper 2012-1261*, January, 2012.
23. Lively, M. C.*, Gorrell, S. E., Hoopes, K. M.*, Woodley, R. S., and Gosnell M. R., "Extraction of Shock Waves and Separation and Attachment Lines From Computational Fluid Dynamics Simulations Using Subjective Logic," *Proceedings of the 2012 AIAA Aerospace Sciences Meeting, Paper 2012-1263*, January, 2012.
24. Gibson, J. R.* and Gorrell, S. E., "Direct Numerical Simulation of Transonic Wake Propagation in the Presence of an Adverse Pressure Gradient and Streamline Curvature," *Proceedings of the 2011 AIAA Fluid Dynamics Meeting, Paper 2011-3091*, June 2011.
25. Clark, K. P.* and Gorrell, S. E. "Time-Accurate CFD Analysis on the Effects of Upstream Stator Loading and Blade Row Interactions on Stator Suction Side Boundary Layer Behavior," *Proceedings of the 2011 AIAA Aerospace Sciences Meeting, Paper 2011-303*, January 2011.
26. Yao, J., Cargill, P. L., Holmes, D. G., and Gorrell, S. E., "Aspects of Numerical Analysis for Unsteady Flows in Aircraft Engines," *Proceedings of the 2010 AIAA Aerospace Sciences Meeting, Paper 2010-1603*, January 2010.
27. Mortensen, C. H.*, Gorrell, S. E., and Woodley, R. S., "An Intelligent Agent Architecture for Concurrent CFD Feature Extraction," *Proceedings of the 2010 AIAA Aerospace Sciences Meeting, Paper 2010-1323*, January 2010.
28. Gorrell, S. E., Yao, J., and List, M. G., "Full Annulus High-Fidelity Fan and Compressor Simulations," *Proceedings of the 2009 DoD High Performance Computing Modernization Program Users Group Conference*, June 2009.
29. Rogers, D. R.*, Gorrell, S. E., Bons, J. P. and Snyder, D. O., "Optimization of Wind Tunnel Walls to Simulate Periodic Boundary Conditions," *Proceedings of the 2009 AIAA Aerospace Sciences Meeting, Paper 2009-0509*, January 2009.
30. Gorrell, S. E., Yao, J., and Wadia, A. R., "High Fidelity URANS Analysis of Swirl Generation and Fan Response to Inlet Distortion," *Proceedings of the 2008 AIAA Joint Propulsion Conference, Paper 2008-4985*, July 2008.
31. Estevadeordal, J., Gorrell, S. E., and Puterbaugh, S. L., "PIV Measurements of Blade-Row Interactions in a Transonic Compressor for Various Operating Conditions," *Proceedings of the 2008 AIAA Joint Propulsion Conference, Paper 2008-4700*, July 2008.

32. Rogers, D. R.*, Gorrell, S. E., Bons, J. P., Snyder, D. O., "Route to an Accurate 2D CFD Model for a Separating Turbine Blade," *Proceedings of the 2008 AIAA Aerospace Sciences Meeting, Paper 2008-0078*, January 2008
33. Estevadeordal, J., Gorrell, S. E., Gebbie, D. A., and Puterbaugh, S. L., "PIV Study of Blade-Row Interactions in a Transonic Compressor," *Proceedings of the 2007 AIAA Joint Propulsion Conference, Paper 2007-5017*, July 2007.
34. List, M. G.*, Gorrell, S. E., Turner, M. G., and Nimersheim, J. A.*, "High Fidelity Modeling of Blade Row Interaction in a Transonic Compressor," *Proceedings of the 2007 AIAA Joint Propulsion Conference, Paper 2007-5045*, July 2007.
35. Yao, J., Gorrell, S. E., and Wadia, A. R., "A Time-Accurate CFD Analysis of Inlet Distortion Induced Swirl in Multistage Fans," *Proceedings of the 2007 AIAA Joint Propulsion Conference, Paper 2007-5059*, July 2007.
36. Gorrell, S. E., Yao J., List, M. G., Turner, M. G., Vickery, R., and Chen, J., "High-Fidelity Simulations for Improved Design of High Performance Fans and Compressors," *Proceedings of the 2007 DoD High Performance Computing Modernization Program Users Group Conference*, June 2007
37. Turner, M. G., Gorrell, S. E., and Car, D., "A Model of Compressor Blade Row Interaction with Shock Induced Vortex Shedding," *Proceedings of the 2006 AIAA Joint Propulsion Conference, Paper 2006-4459*, July 2006.
38. Gorrell, S. E., Tsung, F., Yao, J., and Vickery, R., "Computational Science and Engineering Advances Understanding of Complex Unsteady Flows in High Performance Fans and Compressors," *Proceedings of the 2006 DoD High Performance Computing Modernization Program Users Group Conference*, June 2006.
39. Gorrell, S. E., "Computational Science and Engineering Applied to Military Fan and Compressor Design," *Proceedings of the 2006 AIAA Aerospace Sciences Meeting, Paper 2006-948*, January 2006.
40. Gorrell, S. E., van de Wall, A., and Tsung, F., "Application of Time-Accurate CFD in Order to Account for Blade Row Interactions and Distortion Transfer in the Design of High Performance Military Fans and Compressors," *Proceedings of the 2005 DoD High Performance Computing Modernization Program Users Group Conference*, June 2005.
41. Estevadeordal, J., Gorrell, S. E., and Copenhaver, W. W., "DPIV Study of Wake-Rotor Interactions in a Transonic Compressor Under Various Operating Conditions," *11th International Symposium on Flow Visualization*, Notre Dame University, Notre Dame, IN, August 9-12, 2004.
42. Darby, R. P.*, Falk, E. A., and Gorrell, S. E., "Computational Investigation of IGV-Rotor Interaction in Turbomachinery," *Proceedings of the 2004 AIAA Joint Propulsion Conference, Paper 2004-3757*, July 2004.

43. Falk, E. A., Darby, R. P.*, and Gorrell, S. E., "Influence of IGV Trailing-Edge Geometry on Blade-Row Aerodynamic Interactions in a Transonic Compressor," *9th National Turbine Engine High Cycle Fatigue (HCF) Conference*, 2004.
44. Gorrell, S. E., van de Wall, A., and Blair, J., "High Performance Computing Enables Development of Versatile Affordable Advanced Turbine Engines," *ASC MSRC Fall 2003 Journal*, pp. 2-3.
45. Copenhaver, W., Estevadeordal, J., Gogineni, S., Gorrell, S., and Goss, L., "DPIV Study of Near-Stall Wake-Rotor Interactions in a Transonic Compressor," *4th International Symposium on Particle Image Velocimetry*, Gottingen, Germany, September 17-19, 2001.
46. Gogineni, S., Estevadeordal, J., Copenhaver, W., and Gorrell, S., "Investigation of Wake-Shock Interactions in a Transonic Compressor Using DPIV," *Fifteenth International Symposium on Air Breathing Engines, (ISABE 2001-1196)*, Bangalore, India, September 2-7, 2001.
47. Estevadeordal J., Gogineni, S., Goss, L., Copenhaver, W. and Gorrell, S., "DPIV Study of Wake-Rotor Synchronization in a Transonic Compressor," *Proceedings of the 2001 AIAA Fluid Dynamics Conference, Paper 01-3095*, June 2001.
48. Estevadeordal, J., Gogineni, S., Goss, L., Copenhaver, W. and Gorrell, S., "Study of Flow-Field Interactions in a Transonic Compressor Using DPIV," *Proceedings of the 2000 AIAA Aerospace Sciences Meeting, Paper 00-0378*, January 2000.
49. Gogineni, S., Goss, L., Copenhaver, W. and Gorrell, S., "Development of Digital Two-Color PIV for Turbomachinery Applications," *Proceedings of the 1997 AIAA Aerospace Sciences Meeting, Paper 97-0494*, January 1997.
50. Gorrell, S. E. and Davis, M. W., Jr., "Application of a Dynamic Compression System Model to a Low Aspect Ratio Fan: Casing Treatment and Distortion," *Proceedings of the 1993 AIAA Joint Propulsion Conference, Paper 93-1871*, July 1993.
51. Gorrell, S. E. and Copenhaver, W. W., "Stall Cell Blockage in a High Speed Multistage Axial-Flow Compressor," *Proceedings of the 1990 AIAA Joint Propulsion Conference, Paper 90-1913*, July 1990.
52. Gorrell, S. E., "Detailed Test Plan for the Pratt & Whitney Enhanced Flow Compressor (EFC) Test," *WL-TM-92-201*, September 1992.
53. Gorrell, S. E., "Detailed Test Plan for the Pratt & Whitney Advanced Turbine Engine Gas Generator (ATEGG) XTC66 Compressor Test," *WL-TM-92-200*, March 1992.

External Research Grants and Contracts

Total: \$3,134,537 (\$1,964,968 as Principal Investigator)

Current Grants

OpenTeams, \$20,000, 10/2021 to 9/2022, “Analysis of a Large Turbomachinery Database Using Open Source Tools,” S. E. Gorrell (PI) and R. D. Maynes (Co-PI).

Utah NASA Space Grant Consortium, \$6,000, 5/2021 to 5/2022, “Hybrid Propulsion Development Project,” S. E. Gorrell (PI).

Barzan Aeronautical, \$40,000, 9/2021 to 8/2022, “Aerospace Partners for the Advancement of Collaborative Engineering,” S. E. Gorrell (PI).

Concepts NREC, \$20,000, 11/2021 to 12/2021, “CFD Study of a Wide Flow Range Turbocharger Compressor,” R. D. Maynes (PI) and S. E. Gorrell (Co-PI).

Completed Grants

Concepts NREC, \$64,790, 12/2019 to 11/2020, “Flow Range Extension of a Radial Air Compressor,” S. E. Gorrell (PI) and R. D. Maynes (Co-PI).

Boeing, \$23,750, 7/2019 to 6/2020, Contract through Clemson University “Aerospace Partners for the Advancement of Collaborative Engineering,” S. E. Gorrell (PI).

Pratt & Whitney, \$65,000, 1/2019 to 12/2019, “Design Automation 2018,” J. Salmon (PI), and S. E. Gorrell (Co-PI).

Boeing, \$26,000, 8/2018 to 5/2019, Contract through Clemson University “Aerospace Partners for the Advancement of Collaborative Engineering,” S. E. Gorrell (PI).

Pratt & Whitney, \$88,771, 1/2018 to 12/2018, “Enabling Multi-organization Collaboration,” J. Salmon (PI), and S. E. Gorrell (Co-PI).

Boeing, \$748,600, 12/2013 to 5/2018, “Aerospace Partners for the Advancement of Collaborative Engineering (AerosPACE),” S. E. Gorrell (PI).

Pratt & Whitney, \$106,000, 1/2017 to 12/2017, “Maximizing Multi-User CAD Benefits,” J. Salmon (PI) and S. E. Gorrell (Co-PI).

Pratt & Whitney, \$90,548, 1/2017 to 12/2017, “Design Automation,” J. Salmon (PI) and S. E. Gorrell (Co-PI).

Department of Defense, \$60,000, 12/2016 to 12/2017, Task order through National Aerospace Solutions “Validation of Mixing Plane and Distortion Capabilities of HPCMP CREATE-AV Kestrel/Firebolt Capability 2,” S. E. Gorrell (PI).

Pratt & Whitney, \$120,000, 1/2016 to 12/2016, “Designing with Multi-User CAD,” J. Salmon (PI) and S. E. Gorrell (Co-PI).

Pratt & Whitney, \$70,370, 1/2016 to 12/2016, “Lean Design Methods,” J. Salmon (PI) and S. E. Gorrell (Co-PI).

U. S. Air Force, \$104,547, 7/2014 to 6/2016, “Phase II SBIR subcontract through Concepts, NREC, “Optimizing the Design of a Stability Control Device in Turbopump Inducers,” R. D. Maynes (PI), S. E. Gorrell (Co-PI).

Air Force Research Lab (AFRL), \$128,684, 12/2013 to 11/2015, Phase II SBIR subcontract through Intelligent Light, “Extract Plug-In Scalable Overarching Data Environment,” S. E. Gorrell (PI) and M. R. Jones (Co-PI).

Pratt & Whitney, \$70,000, 1/2015 to 12/2015, “Model Based Design,” J. Salmon (PI) and S. E. Gorrell (Co-PI).

Air Force Research Lab (AFRL), \$15,000, 9/2015 to 12/2015, Task Order through Innovative Scientific Solutions Inc. (ISSI), S. E. Gorrell (PI).

U. S. Air Force, \$150,000, 3/2014 to 9/2015, “Validation and Application of Firebolt 2.0 for Inlet-Fan Interaction,” S. E. Gorrell (PI).

DoD High Performance Computing Modernization Program(HPCMP), \$73,460, 9/2014 to 8/2015, “Investigation of Harmonic Distortion Patterns on Distortion Transfer and Generation,” S. E. Gorrell (PI).

CD-adapco, \$60,000, 10/2012 to 10/2014, “NSF I/UCRC v-CAx site,” C. G. Jensen (PI), S. E. Gorrell (Co-PI).

DoD High Performance Computing Modernization Program(HPCMP), \$40,418, 3/2014 to 8/2014, “Impact of Harmonic Distortion Pattern Content Upon an Isolated Fan,” S. E. Gorrell (PI).

Boeing, \$150,000, 6/2012 to 12/2013, “Collaborative Senior Design Project,” C. G. Jensen (PI), S. E. Gorrell (Co-PI), W. E. Red (Co-PI).

NASA, \$182,666, 8/2011 to 8/2013, Phase II STTR subcontract through Concepts, NREC, “High Suction Performance Inducers for Space Propulsion,” R. D. Maynes (PI), S. E. Gorrell (Co-PI).

Air Force Research Lab (AFRL), \$51,607, 1/2013 to 8/2013, Task Order through Innovative Scientific Solutions Inc. (ISSI), “Experimental Analysis of Turbine Performance Driven by Pulsed Flow,” S. E. Gorrell (PI).

U. S. Air Force, \$100,000, 3/2012 to 2/2013, “Benchmark for CREATE-AV Airframe/Propulsion Integration (API) Product,” S. E. Gorrell (PI).

Air Force Research Lab (AFRL), \$25,000, 6/2012 to 1/2013, Phase I SBIR subcontract through Intelligent Light, “Extract Plug-In Scalable Overarching Data Environment,” S. E. Gorrell (PI) and M. R. Jones (Co-PI).

Air Force Research Lab (AFRL), \$51,660, 11/2011 to 12/2012, Task Order through Innovative Scientific Solutions Inc. (ISSI), “Effect of Pulse Detonation Engine Unsteady Flow and Partial Admission on Turbine Performance,” S. E. Gorrell (PI).

Air Force Office of Scientific Research, \$300,000, 1/2010 to 1/2012, Phase II STTR subcontract through 21st Century Systems, Inc., “Concurrent Agent-enabled Feature Extraction,” S. E. Gorrell (PI).

Department of Defense High Performance Computing Modernization Program, Challenge Project Award for 7.5 Million cpu hours, 10/2008 to 9/2011, ”Full Annulus High Fidelity Fan and Compressor Simulations,” S. E. Gorrell (PI), Michael List (Co-PI) and Jixian Yao (Co-PI). Competitive award peer reviewed by the Air Force and Department of Defense.

Concepts NREC, \$41,667, 1/2009 to 12/2009, ”Performance, Prediction, Verification, and Analysis of Centrifugal Flow Impellers,” D. Maynes (PI) and S. E. Gorrell (Co-PI).

Air Force Office of Scientific Research, \$39,999, 10/08 to 6/09, Phase I STTR subcontract through 21st Century Systems, Inc., “Concurrent Agent-enabled Feature Extraction ,” S. E. Gorrell (PI).

Internal Research Funding

Total: \$52,000 (\$52,000 as Principal Investigator)

Completed Grants

Brigham Young University, \$10,000, 9/2010 to 8/2011, College Supplemental Research Initiation Funds, “Wind Engineering Mesoscale Processes and Turbine Dynamics,” J. Crockett (PI) and S. E. Gorrell (Co-PI).

Brigham Young University, \$20,000, 2/2010 to 12/2010, College Supplemental Research Grant “High-Fidelity Computational Fluid Dynamics Simulations at the BYU Fulton Supercomputing Laboratory,” S. E. Gorrell (PI).

Brigham Young University, \$4,000, 9/2009 to 12/2009, Graduate Mentoring Award “Particle Image Velocimetry Analysis of Vortex Shedding in a Transonic Compressor,” S. E. Gorrell (PI).

Brigham Young University, \$18,000, 1/2009–12/2009, Research Initiation Grant, “Experimental and Numerical Research on Unsteady Flows in Turbomachines,” S. E. Gorrell (PI).

Honors and Awards

American Institute of Aeronautics and Astronautics, 2016. Certificate of Appreciation for outstanding support and years of dedication as Vice President - Education.

AIAA Fluid Dynamics Technical Committee, 2015. Best Paper Certificate of Merit for Most Quantitatively Descriptive Flow Visualization Animation.

BYU Mechanical Engineering Department, 2015. Outstanding Faculty Award.

ASME Innovative Additive Manufacturing 3D (IAM3D) Challenge, 2014. Best Overall Award.

American Society of Engineering Education Corporate Member Council, 2014. Excellence in Engineering Collaboration award.

15th Annual CorpU Awards for Excellence and Innovation, 2014. Excellence in Launching.

Chief Learning Officer magazine, 2014. Gold award for Collaboration.

Chief Learning Officer magazine, 2014. Gold award for Innovation.

Brandon Hall Excellence Awards, 2014. Silver award for Best Extended Enterprise Learning Program.

Brandon Hall Excellence Awards, 2014. Silver award for Best Use of Social / Collaborative Learning.

American Society of Engineering Education (ASEE), 2013. Corporate Member Council Collaboration Award.

U. S. News and World Report with Innovate+Educate, 2013. HIRE Award.

AIAA Special Service Citation, For service as Chair of the AIAA Professional Member Education Committee from 2008 to 2012.

Best Paper/Presentation Award, 2011 Partners for the Advancement of Collaborative Engineering Education (PACE) Forum, 2011. Paper title “CFD Analysis of PACE Formula-1 Car,” by Satyan Chandra, Allison Lee, Steven Gorrell, and C. Greg Jensen.

Department of the Air Force Award for Civilian Achievement, 2007. In recognition of distinguished performance as an Aerospace Engineer, Air Force Research Laboratory, from November 2005 to August 2007.

AIAA Associate Fellow, 2007. American Institute of Aeronautics and Astronautics.

Scientific/Technical Achievement Award, 2006 AFRL Finalist and Propulsion Directorate Winner.

Award Nominee, 2005 AFRL nominee for Air Force Modeling and Simulation Award - Analysis Category.

Senior Member, 2005. American Institute of Aeronautics and Astronautics.

Award Nominee, 2003 Turbine Engine Division nominee for Scientist of the Year.

Award, 2003 NASA Group Achievement Award.

Best Paper Award, 2002 Dayton-Cincinnati Aerospace Science Symposium Best Turbomachinery Paper.

Award Nominee, 1993 Turbine Engine Division nominee for Engineer of the Year.

Project of the Quarter, 1992 Propulsion Directorate In-House Project of the Quarter team member.

Invited Lectures, Presentations and Papers

“Analysis of Inlet Distortion Using Proper Orthogonal Decomposition,” Intelligent Light Exposition Booth, Invited Presentation, January 2016.

“Industry-Academia Perspective on Future Workforce Development,” AIAA Propulsion and Energy Forum, Invited Panelist, July 2015.

“Proper Orthogonal Decomposition Applied to Large CFD Simulations,” Intelligent Light Exposition Booth, Invited Presentation, January 2015.

“Teaching and Inspiring the Next Generation of Aerospace Engineers through a Boeing-Multi-University Course to Design, Build and Fly a UAV,” Global Product Data Interoperability Summit, Keynote Presentation, September 2014.

“Tools and Techniques for Analyzing Unsteady Turbomachinery Flows,” Pratt and Whitney, Invited Presentation, July 2014.

“An Introduction to Gas Turbine Engines and Propulsion Trends for Next Generation Aircraft,” Utah Valley University Physics Department Colloquium, Invited Presentation, March 2014.

“Turbomachinery Research at Brigham Young University,” Intelligent Light Exposition Booth, Invited Presentation, January 2014.

“University Use of STAR-CCM+, STAR Global Conference, Invited Panelist, March 2013.

“CFD Data Mining,” BYU Fulton Supercomputing Laboratory, Invited Presentation, March 2011.

“How Computational Science and Engineering at BYU is Solving Gas Turbine Engine Technical Challenges,” BYU Fulton Supercomputing Laboratory, Invited Presentation, October 2010.

“Aspects of Numerical Analysis for Unsteady Flows in Aircraft Engines,” AIAA Gas Turbine Engine Technical Committee, Invited Paper, January 2010.

“Understanding Distortion Transfer and Generation by Means of Full-Annulus Time-Accurate Simulations of Multistage Fans,” Society of Automotive Engineers (SAE) S16 Committee on Aircraft Engine Inlet Distortion, Invited Speaker, February 2008.

“Understanding Unsteady Flow Features in Transonic Compressors,” Computing in Science and Engineering, Invited paper, November/December 2007.

“High-Fidelity (3D & 3D time accurate) Engine Simulation,” ASME Turbo Expo, Co-organizer and Panelist, May 2007.

“Validation of URANS Ability to Model Distortion Transfer and Generation in Multistage Fans,” Massachusetts Institute of Technology Gas Turbine Laboratory Lecture Series, Invited Speaker, May 2007.

“Computational Science and Engineering Applied to the Design and Analysis of High Performance Fans and Compressors,” Ohio State University, Department of Aerospace Engineering Seminar, Invited Speaker, April 2007.

“Use of CFD to Improve Design and Performance Prediction Tools,” Symposium on Recent Developments and Emerging Trends in Computational Design, Analysis and Optimization, Invited Speaker, January 2007.

“Compression System Computational Science and Engineering,” DoD/DoE/FAA/NASA Propulsion and Power System Alliance Forum, Presenter, November 2006.

“Turbine Engine Fan and Compressor Research at the AFRL Propulsion Directorate,” Brigham Young University, Mechanical Engineering Department Graduate Student Seminar, Invited Speaker, November 2006.

Air Force Scientific Advisory Board review of Propulsion Directorate, Presenter, October 2006.

“Blade-Row Interaction Research at the AFRL Propulsion Directorate,” Minnowbrook V Workshop on Unsteady Flows in Turbomachinery, Invited Speaker, August 2006.

“High-Fidelity (3D & 3D time accurate) Engine Simulation,” ASME Turbo Expo 2006, , Co-organizer, Panelist and Presenter, May 2006.

DoD Air Platforms Technology Area Review and Assessment (TARA), Presenter, April 2006.

“Data Challenges with Time-Accurate Simulation of Military Fans and Compressors,” Data Intensive Computing Environment (DICE) Vendors Day, Invited Speaker, March 2006.

Aeronautical Systems Center Major Shared Resource Center SGI Altix Ribbon Cutting Ceremony, Invited Presenter, February 2006.

“An Investigation of Wake-Shock Interactions in a Transonic Compressor with DPIV and Time-Accurate CFD,” Massachusetts Institute of Technology Gas Turbine Laboratory Lecture Series, Invited Speaker, May 2005.

Von Karman Institute Lecture on Unsteady Flows in Compressors, Contributing Author, April 2005.

AFRL Workshop on Computational Science and Engineering, Presenter and Panelist, January 2005.

“Time-Accurate Simulations of Blade Row Interactions in Transonic Compressors,” Aeronautical Systems Center Major Shared Resource Center CFD Day, Presenter, September 2004.

“Blade-Row Interaction Effects in Highly Loaded Transonic Compressors,” Turbine Engine Technology Symposium Workshop, Presenter, September 2004.

Aeronautical Systems Center Major Shared Resource Center SGI Origin Ribbon Cutting Ceremony, Invited Presenter, October 2003.

“Revolutionary Technologies for Versatile Core Compressors,” IHPTET/VAATE Steering Committee, Presenter, August 2003.

“Stator-Rotor Interactions in a Transonic Compressor: Description of a Loss Producing Mechanism,” Wright State University College of Engineering Graduate Seminar, Invited Speaker, October 2002.

“Stator-Rotor Interactions in a Transonic Compressor: Description of a Loss Producing Mechanism,” Massachusetts Institute of Technology Gas Turbine Laboratory Lecture Series, Invited Speaker, May 2002.

Invited Panel and Committee Activities

U. S. Department of Energy’s Office of Technology Transitions Merit Reviewer, 2020.

National Science Foundation Reviewer, 2020.

Department of Defense National Defense Science and Technology Graduate (NDSEG) Fellowship, Proposal Reviewer, 2017.

Department of Defense SMART Scholarship Evaluation Panel, Proposal Reviewer, 2015.

NASA Subsonic Fixed Wing Aerothermodynamics Technical Working Group, Member, 2007.

High Performance Computing Modernization Program (HPCMP) User Advocacy Group (UAG), Air Force Representative, 2006 – 2007.

High Performance Computing Modernization Program (HPCMP) Technology Insertion 2007 Usability Team, Evaluator, 2006.

Professional Activities

Memberships

American Society of Mechanical Engineers (ASME), 1993 – Present.

ASME International Gas Turbine Institute (IGTI) Turbomachinery Committee, 1993 – Present.

American Institute of Aeronautics and Astronautics (AIAA), 2004 – Present. **Associate Fellow.**

AIAA Air Breathing Propulsion Technical Committee, 2004 – 2008.

AIAA Professional Member Education Committee, 2004 – 2017.

AIAA Gas Turbine Engine Technical Committee, 2008 – 2015.

American Society of Engineering Education, 2013 – 2017.

Society and Committee Leadership

AIAA Vice President – Education, 2013 – 2016. Elected Board of Directors position to help manage and direct the 35,000 member Institute.

AIAA Vice President Elect – Education, 2012 – 2013. Elected Board of Directors position to help manage and direct the 30,000 member Institute.

Chair, AIAA Professional Member Education Committee, 2008 – 2011.

AIAA Professional Member Education Committee Liaison to the Technical Activities Committee, 2004 – 2007.

Conference Leadership

Technical Discipline Chair, AIAA Science and Technology Forum, 2018. Invited position responsible for managing the paper reviews and session organization of approximately 70 papers submitted to the conference.

Forum Organizing Committee, AIAA Propulsion and Energy Forum, 2015. Invited position responsible for helping identify and organize panel sessions for the conference.

Vanguard Chair – Unsteady Flows In Turbomachinery, ASME Turbo Expo, 2008, 2010, 2011. Invited position responsible for organizing sessions and reviews for all papers submitted to the ASME Turbo Expo conference track of unsteady flows in turbomachinery. Select session organizers and monitor reviews to evaluate submitted papers for presentation at conference and publication in the ASME Journal of Turbomachinery.

Vanguard Chair – Design Methods and CFD Modeling for Turbomachinery, 2006, 2007. Invited position responsible for organizing sessions and reviews for all papers submitted to the ASME Turbo Expo conference track of design methods and CFD modeling for turbomachinery. Select session organizers and monitor reviews to evaluate submitted papers for presentation at conference and publication in the ASME Journal of Turbomachinery.

Special Panel Session, ASME Turbo Expo, 2006, 2007. Co-organized panel session on High-Fidelity (3D & 3D time accurate) Engine Simulations.”

Session Chair, numerous times, ASME Turbo Expo.

Session Chair, numerous times, AIAA Joint Propulsion Conference.

Peer Review Responsibilities

Associate Editor, *ASME Journal of Turbomachinery*, Compressor Aerodynamics, March 2014 – 2017

ASME Journal of Turbomachinery

AIAA Journal of Propulsion and Power

ASME Journal of Fluids Engineering

Journal of Aerospace Science and Technology

European Journal of Engineering Education

Journal of Thermal Science and Engineering Applications

ASME Turbo Expo Conference

AIAA Joint Propulsion Conference

AIAA Aerospace Sciences Meeting

National Research Council Panel for the Review of Proposals for NASA's Intelligent Propulsion System Foundation Technology Program, 2004.

University Service

University Assignments

Ira A. Fulton College of Engineering Research Proposal Review Committee, May 2018 – Present

Graduate Research Fellowship Proposal Reviewer, 2008, 2009, 2012, 2014, 2017

NASA Space Grant Proposal Reviewer, 2016, 2017

Office of Research and Creative Activities (ORCA) Grant Reviewer, 2008 – 2009.

Olsen Mentorship in Biomedical Engineering Fellowship Reviewer, 2009, 2010, 2012

Department Committees

Chair, Faculty Search Committee, 2018 – Present

Member, Faculty Search Committee, 2014 – 2018.

Member, Fluid Mechanics Ph.D. Qualifying Exam Committee, 2008, 2014 – Present.

Advisor, ASME Student Section, 2010 – 2014.

Member, Thermodynamics Ph.D. Qualifying Exam Committee, 2009 – 2013.

Co-Advisor, Wind Energy Club, 2009 – 2010.

Member, Facilities & Safety Committee, 2008 – 2010.

Member, Ad hoc Graduate Math Curriculum Committee, 2009 – 2010.

Guest Lecture Facilitation & Hosting

Tom Shih, Ph.D., Purdue University School of Aeronautics and Astronautics, Professor and Department Head.

Karen Thole, Ph.D., The Pennsylvania State University, Professor and Department Head.

William Copenhaver, Ph.D., Air Force Research Laboratory, Turbine Engine Division.

Deryl Snyder, Ph.D., CD-Adapco, Director, Aerospace and Defense Sector.

Lisa Mesaros, Ph.D., CD-Adapco, Academic Program Manager, Americas.

Community Outreach

Organized visit of underprivileged 6th grade students from two Provo schools to Mechanical Engineering Department in 2011 – 2013, 2015.

Student Mentoring

Current Graduate Students

Andrew Bedke, M.S., “The Effects of Transition Abruptness on Inlet Flow Distortion Transfer and Generation in Transonic Fans at Various Operating Points.”

Chase Oliphant, Ph.D., “Robust, Accurate, and Efficient Physics-Based Turbopump Performance Models for Optimal Rocket Engine and Vehicle Design.”

Ph.D. Graduate Students Advised

Spencer Bunnell, Ph.D., “Real-Time Design Space Exploration of Static and Vibratory Structural Responses in Turbomachinery Through Surrogate Modeling with Principal Components.” May 2020. Currently R&D Senior Computer Scientist with Sandia National Laboratories.

Tate Fanning, Ph.D., “Investigating Inducer Performance Over a Wide Range of Operating Conditions.” August, 2019. Currently Mechanical Engineer specializing in turbocharger design with TiAL Sport.

Mark Fernelius, Ph.D., “Experimental and Computational Analysis of an Axial Turbine Driven by Pulsing Flow.” April 2017. Currently Aerospace Engineer with Air Force Research Laboratory.

Brett Stone, Ph.D., co-advised with Ed Red, “Maximizing Virtual MUCAx Engineering Design Team Performance.” April 2016. Currently Sr. Mechanical Engineer with Northrop Grumman.

Ryan Lundgreen, Ph.D., co-advised with Dan Maynes, “Improving the Suction Performance and Stability of an Inducer with an Integrated Inlet Cover Bleed System Known as a Stability Control Device.” August 2015. Currently Engineer with Pratt and Whitney.

M.S. Graduate Students Advised

Alex Newell, M.S., “Effect of Ported Shroud Casing Treatment Modifications on Operational Range and Limits in a Centrifugal Compressor.” April, 2021. Currently Associate Research Engineer for the University of Dayton Research Institute as a contractor for the AFRL’s Aerospace Systems Directorate.

Greg Bird, M.S., “Linear and Nonlinear Dimensionality-Reduction-Based Surrogate Models for Real-Time Design Space Exploration of Structural Responses.” August, 2020. Currently Mechanical Engineering Analyst at Lawrence Livermore National Laboratory.

Andrew Orme, M.S., “Analysis of Inlet Distortion Patterns on Distortion Transfer and Generation Through a Highly Loaded Fan Stage.” August, 2020. Currently Process Engineer at Hill Air Force Base.

Christopher Thelin, M.S., co-advised with John Salmon, “Application and Evaluation of Full-field Surrogate Models in Engineering Design Space Exploration.” 2019. Currently GSE Methods Engineer at Pratt Whitney.

Daniel Soderquist, M.S., “Analysis of Distortion Transfer and Generation through a Fan and a Compressor Using Full-annulus Unsteady RANS and Harmonic Balance Approaches.” April, 2019. Currently Aerospace Engineer at Arnold Engineering and Development Complex.

Mikkel Unrau, M.S., “Analysis of the effects of inlet distortion on stall cell formation in a transonic compressor using CREATE-AV Kestrell.” December 2018. Currently Systems Engineer at Raytheon Missile Systems.

Matthew Wald, Combined M.S. and MBA, “Improving and Predicting Effectiveness of Dispersed, Multidisciplinary Design Teams.” April 2018. Currently Senior Human Resource Generalist/Operations Specialist at Honeywell.

Ivan Yorgason, M.S., “Heteromorphic to Homeomorphic Shape Match Conversion Toward Fully Automated Mesh Morphing to Match Manufactured Geometry.” June 2016. Currently Senior Aeronautical Engineer with Lockheed-Martin.

Marshall Peterson, M.S., “Implementations of Fourier Methods in CFD to Analyze Distortion Transfer and Generation Through a Transonic Fan.” June 2016. Currently Software Developer with Adobe Systems.

Kurt Hinkle, M.S., “An Automated Method for Optimizing Compressor Blade Tuning.” April 2016. Currently Aeronautical Engineer with Lockheed-Martin.

Ron Spencer, M.S., “Analysis of High Fidelity Turbomachinery CFD Using Proper Orthogonal Decomposition.” April 2016. Currently Mechanical Engineer with Ford Motor Company.

Kasey Webster, M.S., “Using STAR-CCM+ to Evaluate Multi-User Collaboration in CFD.” December 2015. Currently a Manufacturing Mechanical Engineer with Raytheon.

Ryan Cluff, Combined M.S. and MBA, “An Investigation of Off-Design Operation in High Suction Performance Inducers.” June 2015. Currently a Senior Product Manager with Amazon.

Joseph Becar, M.S., “A Collaborative Conceptual Aircraft Design Environment for the Design of Small-Scale UAVs in a Multi-University Setting.” June 2015. Currently Principal Engineer Propulsion at Northrop Grumman.

Trevor Blanc, M.S., “Analysis and Compression of Large CFD Data Sets Using Proper Orthogonal Decomposition.” August 2014. Completed MBA at BYU. Currently Finance Professional at Amazon.

David Weston, M.S., “High Fidelity Time Accurate CFD Analysis of a Multi-stage Turbofan at Various Operating Points in Distorted Inflow.” August 2014. Currently Senior Researcher with Ohio Aerospace Institute.

Matthew Marshall, M.S., “Validation of a Modified Version of OVERFLOW 2.2 for Use with Turbomachinery Under Clean and Total Pressure Distorted Conditions and a Study of Blade Loading in Distortion.” June 2014. Currently Engineer with Parametric Solutions, Inc..

Mark Fernelius, M.S., “Effect of Full-Annular Pressure Pulses on Axial Turbine Performance.” December 2013. **NDSEG Fellowship Recipient.**

Jesse Johnson, M.S., “The Effects of Freestream Turbulence on Serpentine Diffuser Performance,” December 2012. Currently Process Engineer for IM Flash Technologies.

Matthew Lively, M.S., “The Extraction of Shock Waves and Separation and Attachment Lines From Computational Fluid Dynamics Simulations Using Subjective Logic,” December 2012. Currently Mechanical/Aerospace Design and Analysis Engineer at Northrup Grumman.

Ryan Shaw, M.S., “Application of Subjective Logic to Vortex Core Line Extraction and Tracking from Unsteady Computational Fluid Dynamics Simulations,” April 2012. Currently Sierra Thermal/Fluid Codes User Support Analyst at Sandia National Laboratory.

Stephen McQuay, M.S., “SMB-Interp: an N-Th Order Accurate, Distributed Interpolation Library,” December 2011. Currently Software Engineer with Apple.

Jeffrey Gibson, M.S., “Direct Numerical Simulation of Transonic Wake Flow in the Presence of an Adverse Pressure Gradient and Streamline Curvature”, December 2011. Completed Ph.D. at Penn State University. Currently Combustion Engineer with Siemens Energy.

Ken Clark, M.S., “A Numerical Analysis on the Effects of Blade Loading on Vortex Shedding and Boundary Layer Behavior in a Transonic Axial Compressor,” August 2011. **NDSEG Fellowship Recipient.** Completed Ph.D. at Penn State University. Currently Engineer at Pratt and Whitney.

Clif Mortensen, M.S., “A Computational Fluid Dynamics Feature Extraction Method Using Subjective Logic,” August 2010. **NDSEG Fellowship Recipient.** Completed Ph.D. at University of California Los Angeles. Currently Design Physicist with Lawrence Livermore National Laboratory.

Scott Reynolds, M.S., “Particle Image Velocimetry Analysis on the Effect of Stator Loading on Transonic Blade-Row Interactions,” April 2010. Currently Engineer at Idaho National Laboratory.

Daniel Rogers, M.S., “Design of a Three-Passage, Low Reynolds Number Turbine Cascade with Periodic Flow Conditions,” December 2008. Currently Aerodynamics Engineer with Parametric Solutions, Inc..

B.S. Honors Students Advised

Andrew Hosford, “Mesh Deformation Approach for Aerodynamic Optimization Using a Genetic Algorithm,” August 2008. Completed M.S. at Stanford University. Currently Director of Engineering with Gauss Surgical.

Undergraduate Students Advised

Alex Magee, Research Mentorship Program, Aerodynamics of Centrifugal Compressors, Currently Freshman in BYU Mechanical Engineering Department.

Jon Rees, Me En 497R, CAD Modeling and Meshing of Turbomachinery, Currently Senior in BYU Mechanical Engineering Department.

Tyler Adams, Undergraduate Research Assistant, Computational Fluid Dynamic Analysis of Turbomachinery, Currently Senior in BYU Mechanical Engineering Department.

Addison Pulsipher, Me En 497R, Computational Fluid Dynamic Analysis of Turbomachinery.

Brett Coles, Me En 497R, Development of Hybrid Rocket Propulsion Engine.

Hayden Oliver, Me En 497R, Development of Hybrid Rocket Propulsion Engine.

Jessica Stringer, Women’s Research Mentorship Program, UAV Design.

Ian Potts, Me En 497R, Applying Harmonic Balance Techniques to Turbomachinery Simulations and Analysis. Currently M.S. Student at The Ohio State University.

Ryan Moeller, Testing of Search and Rescue rope systems. Currently M.S. Student at Idaho State University.

Michelle Eldridge, Testing of Search and Rescue rope systems. Graduated from BYU Mechanical Engineering Department.

Daniel Soderquist, Me En 497R and Research Assistant, Applying Harmonic Balance Techniques to Turbomachinery Simulations and Analysis. Completed M.S. in Mechanical Engineering Department at Brigham Young University.

Riley Budd, Computer Aided Design, Currently Senior in BYU Mechanical Engineering Department.

Riley Creer, Turbomachinery CFD. Currently Ph.D student at Penn State University.

Brent O'Dell, Me En 497R and Research Assistant, Applying Harmonic Balance Techniques to Turbomachinery Simulations and Analysis.

Iggy Matheson, Me En 497R, Computational Fluid Dynamics. Completed M.S. at Utah State University. Currently Ph.D. Student at University of Arizona.

Jaron Ellingson, CFD post-processing. Currently Graduate Student in BYU Mechanical Engineering Department.

Andrew Warren, CFD meshing and post-processing.

Ryan Packer, Turbomachinery CFD simulations. Completed B.S. and M.S. in BYU Mechanical Engineering Department.

Joshua Wilson, Pulsed flow turbine experiments and CFD data mining. Completed M.S. in BYU Mechanical Engineering Department.

Bryce Winsor, Electromagnetic flow control. Currently Engineer with Bechtel Marine Propulsion Corporation.

Adam Hickman, Turbulence of wake in adverse pressure gradient, CFD analysis of vortex shedding in turbomachine. Completed Ph.D. at University of Notre Dame. Currently Engineer at Pratt and Whitney.

Ryan Cluff, UGA, Turbopump inducer CFD. Completed Combined M.S. MBA at BYU.

Satyan Chandra, Me En 595R, Aerodynamic simulation of BYU Partners for the Advancement of Collaborative Engineering Education (PACE) Formula 1 car. Currently engineer at Tesla Motors.

Allison Lee, Me En 595R, Aerodynamic simulation of BYU PACE Formula 1 car. Currently Ph.D. student in Mechanical Engineering at Brigham Young University.

Alan Day, Me En 595R, Aerodynamic simulation of BYU PACE Formula 1 car.

Joey Nielson, Me En 595R, Aerodynamic simulation of BYU PACE Formula 1 car. Completed M.S. in Mechanical Engineering at BYU.

Derek Jensen, Me En 595R, Aerodynamic simulation of BYU PACE Formula 1 car. Completed Ph.D. at University of Utah.

Kevin Hoopes, CFD data mining. Completed M.S. degree at Virginia Tech. Currently working at Southwest Research Institute.

Matthew Marshall, CFD data mining. Completed M.S. degree at BYU. Currently Engineer with Parametric Solutions, Inc..

Bryce McEwen, **ORCA Grant Recipient** and Me En 595R, Wind turbine aerodynamics. Completed M.S. in Mechanical Engineering at BYU.

Benton Russell, Fluent tutorials for Me En 412.

Andrew Hosford, CFD modeling of racecar downforce wing. Completed M.S. at Stanford University. Currently Vice President, Engineering with Gauss Surgical.

Jeffrey Gibson, Wind tunnel turbomachinery cascade design. Completed M.S. at BYU. Completed Ph.D. at Penn State University. Currently Combustion Engineer with Siemens Energy.

Jeremy Alsup, Wind tunnel turbomachinery cascade design and CFD post-processing. Completed M.S. at BYU.

Gavin Holt, PIV post-processing on Fulton Supercomputing Laboratory computer. Completed M.S. at BYU. Currently Thermal Systems Engineer at GE Aviation.

Ken Clark, Install turbomachinery CFD code on Fulton Supercomputing Laboratory. Completed M.S. at BYU. Completed Ph.D. at Penn State University. Currently Engineer at Pratt and Whitney.

Michael Mohlman, Fluent tutorials for Me En 412. Currently a U. S. Air Force Officer.

Scott Reynolds, PIV post-processing on Fulton Supercomputing Laboratory computer. Completed M.S. at BYU. Currently Engineer at Idaho National Laboratory.

Advising of Student Awards

Advisor for student Ron Spencer who co-authored AIAA paper, “EPIC – An Extract Plug-In Components Toolkit for in-Situ Extracts Architecture” that won “Best Paper Certificate of Merit for Most Quantitatively Descriptive Flow Visualization Animation.”

Advisor for student Aaron Inuye who was part of team that won the ASME Innovative Additive Manufacturing 3D (IAM3D) Challenge, 2014. Best Overall Award.

Advisor for students Satyan Chandra and Allison Lee who won the Best Paper/Presentation Award for “CFD Analysis of PACE Formula-1 Car,” 2011 Partners for the Advancement of Collaborative Engineering Education (PACE) Forum, 2011.

Other Student Mentoring

Michael List, University of Cincinnati, M.S. Student, Research Advisor, 2006 – 2008.

Sean Nolan, Massachusetts Institute of Technology, Ph.D. Student, Research Advisor, 2006 - 2009.

Barbara Botros, Massachusetts Institute of Technology, M.S. Student, Research Advisor, 2006 - 2007.

Tiawo Ogunjobi, Wright State University, Co-op Student, Technical Advisor, 2004.

Nathan Woods, Wright State University, Co-op Student, Technical Advisor, 2003 - 2004.

Robert Darbe, Oklahoma State University, M.S. Student, Research Advisor, 2003.

Justin England, Carnegie Mellon University, Summer Student, Technical Advisor, 2002.

Courses Taught at BYU

Aerospace Partners for the Advancement of Collaborative Engineering (AerosPACE) Capstone Course (Me En 495R), Founding academic partner, Developer of curriculum, Director of all participating universities, and Coach for this Capstone course. AerosPACE is a multi-University-Industry partnership with the vision of developing a capstone engineering design course that motivates students to enter the aerospace profession and fills gaps in student competencies. The 2018 – 2019 AerosPACE course was a partnership among Boeing, Brigham Young University, Clemson University, Georgia Institute of Technology, Iowa State University, Purdue University, Tuskegee University, University of Washington, and Everett Community College to design, build, and fly a UAV for surveillance and inspection missions. 49 students from 5 academic institutions are involved. I also coach one of the five teams made up 10 students from three Universities. The program has grown from 19 students from four universities in 2012–2013 to as many as 72 students from 8 different universities for the 2015–2016 academic year. Since its inception a total of 315 students have participated in the program. Fall 2013 – Winter 2014, Fall 2014 – Winter 2015, Fall 2015 – Winter 2016, Fall 2016 – Winter 2017, Fall 2017 – Winter 2018, Fall 2018 – Winter 2019, Fall 2019 – Winter 2020, Fall 2020 – Winter 2021, Fall 2021 – Winter 2022.

Me En 426, Gas Turbine and Jet Engine Design. Winter 2011, Winter 2012, Winter 2013, Winter 2014, Winter 2016, Winter 2017, Winter 2018, Winter 2019, Winter 2020, Winter 2021.

Me En 312, Fluid Mechanics. Fall 2016, Winter 2018, Fall 2018, Winter 2020, Fall 2020, Winter 2021.

Me En 611, Turbulence. Winter 2008, Winter 2010, Winter 2012, Fall 2013, Fall 2015, Fall 2017, Fall 2019, Fall 2021.

Me En 541, Computational Fluid Dynamics and Heat Transfer. Winter 2015, Winter 2016, Winter 2017, Winter 2021.

Me En 595R – Turbomachinery. Summer 2016.

Me En 510, Compressible Flow. Winter 2009, Winter 2011, Fall 2012, Fall 2014, Fall 2018.

Me En 495R, Mentored Learning for Undergraduate Coursework. COllaborative Multi-disciPlinAry Capstone projecT (COMPACT). Fall 2012 – Winter 2013. Contributed to development and management of a new course with Boeing Learning Training and Development. Mentored and coached 6 students from BYU, 5 from Georgia Institute of Technology, and 5 from Purdue University. Helped develop an overall concept and architecture for an industry – university student capstone course to train and motivate the next generation of aerospace engineers. The course establishes multidisciplinary, distributive teams in such a way to teach students the industry principles of multi-user, collaborative design.

Me En 475/476 Capstone Coach, Integrated Product and Process Design. Fall 2008, Winter 2009, Fall 2009, Winter 2010, Fall 2012.

Me En 412, Applications of Fluid Dynamics. Fall 2007, Fall 2008, Fall 2009, Fall 2010, Fall 2011.

Community Service

Member, Utah County Sheriff Search and Rescue, 2016 – Present. Currently serving term as President.

Scoutmaster, Boy Scouts of America, Fairborn Ohio, 1990 – 1993; Springfield Ohio, 1995 – 2000; Spanish Fork Utah, 2010 – 2012, 2015 – 2018.

Coach of youth soccer, softball, baseball, basketball and football, Spanish Fork City, 2010 – Present.