

K. Todd Lowe

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Education and Training

B.S.	2001	Aerospace Engineering, Virginia Tech
M.S.	2004	Aerospace Engineering, Virginia Tech
Ph.D.	2006	Aerospace Engineering, Virginia Tech

Research and Professional Experience

2016-, Associate Professor, Department of Aerospace and Ocean Engineering, Virginia Tech
2010-2016, Assistant Professor, Department of Aerospace and Ocean Engineering, Virginia Tech
2006-2010, Vice President for Research and Development, AUR, Inc.

Prof. Todd Lowe leads a research team focused on the aeroacoustics and aerodynamics of propulsion inlets and exhausts with advanced capabilities in laser-based optical diagnostics. Fundamentally, his contributions have provided insights for understanding turbulence transport and noise in three-dimensional boundary layers and compressible boundary and shear layers. His instrumentation research has resulted in several notable impacts, including new flow diagnostics with very high spatial and temporal resolution, interpreting particle lag effects on turbulence statistics, flow acceleration measurements, and robust, large field velocimetry for large facilities. Since 2007, he has been the P.I. or co-P.I. in \$9M (\$5M of that total being his credited share) of research contracts and awards from government and industry sponsors including the Office of Naval Research, NASA, US Air Force, Pratt & Whitney, Rolls-Royce, GE and several small businesses. He is co-inventor of two utility patents (nos. 8434723 and 8348553) and has co-authored publications in the areas of laser diagnostics for fluid dynamics, turbulent shear flows, propulsion and power, and signal processing. Since 2011, he has advised three Ph.D. graduates and thirteen M.S. thesis graduates; he currently advises eight Ph.D. students and six M.S. students.

Professional Service and Activities

- AIAA Associate Fellow (2015)
- Co-Director of the Virginia Tech Advanced Propulsion and Power Laboratory
- Associate Director of the Pratt & Whitney/Virginia Tech Center of Excellence
- AIAA Aerodynamic Measurement Technology Technical Committee (2010 - present)
 - Co-Chair-elect
 - Conferences subcommittee chair 2016 - present
 - Conference co-chair, 2015 Aerodynamic Measurement Technology/Ground Test Conference in Aviation 2015
 - Webmaster: 2013 – 2016
- Core member of the Center for Renewable Energy and Aerodynamic Testing (CREATE) at Virginia Tech
- Advisory committee member for the International Symposium on Applications of Laser Techniques and Imaging to Fluid Mechanics

Peer reviewed journal articles:

Note: * Indicates advisee.

1. Cadel DR*, Zhang D, **Lowe KT**, and Paterson EG, "Unsteady boundary layer development on a wind turbine blade: an experimental study of a surrogate problem," accepted for publication in *Experiments in Fluids*.
2. Vincent T*, **Lowe KT**, and Schetz JA, "Enhanced low-order model with radiation for total temperature probe analysis and design," accepted for publication in *SAE International Journal of Aerospace*.
3. Frohnapfel D*, O'Brien WF, and **Lowe KT**, "Experimental quantification of fan rotor effects on inlet swirl using swirl distortion descriptors," accepted for publication in *ASME Journal of Engineering for Gas Turbines and Power*.
4. Guimarães T*, **Lowe KT**, and O'Brien WF, "Complex Flow Generation and Development in a Full-Scale Turbofan Inlet," accepted for publication in *ASME Journal of Engineering for Gas Turbines and Power*.
5. Guimarães T*, **Lowe KT**, and O'Brien WF, 2017 "The StreamVane turbofan inlet swirl distortion generator: mean flow and turbulence structure," *ALAA Journal Propulsion and Power*, doi:10.2514/1.B36422.
6. Otero R*, **Lowe KT** and Ng W 2017, 2017 "Nonintrusive Gas-Turbine Engine-Exhaust Characterization Using Acoustic Measurements," *ALAA Journal Propulsion and Power*, doi:10.2514/1.B36579.
7. Otero R*, **Lowe KT** and Ng W 2017, "Non-Intrusive Acoustic Measurement of Flow Velocity and Temperature in a High Subsonic Mach Number Jet," *Measurement Science and Technology*, 29(1), 015106.
8. Reardon J*, Schetz JA and **Lowe KT**, 2017 "Computational Modeling of Total-Temperature Probes," *ALAA Journal of Thermophysics and Heat Transfer*, doi:10.2514/1.T4991.
9. Otero R*, **Lowe KT** and Ng W 2017 "Extension of sonic anemometry to high subsonic Mach number flows," *Measurement Science and Technology*, 28(3), 035306, doi:10.1088/1361-6501/aa54ed.
10. Ecker TE*, **Lowe KT** and Ng WF 2017 "On the distribution and scaling of convective wavespeeds in the shear layers of heated supersonic jets," *Flow, Turbulence and Combustion*, 98, 355-366, doi:10.1007/s10494-016-9752-3.
11. Cadel D* and **Lowe KT** 2016 "Investigation of measurement sensitivities in cross-correlation Doppler global velocimetry," *Optics and Lasers in Engineering*, 86, 44-55.
12. Xue S, Guillot S, Ng WF, Fleming J, **Lowe KT**, Samal N* and Stang UE 2016 "An experimental investigation of the performance impact of swirl on a turbine exhaust diffuser/collector for a series of diffuser strut geometries," *ASME Journal of Engineering for Gas Turbines and Power*, 138(9), 092603.
13. Barboza K, Ma L, **Lowe KT**, Ekkad S and Ng W 2016 "A diagnostic technique for particle characterization using laser light extinction," *ASME Journal of Engineering for Gas Turbines and Power*, 138(11), 111601.
14. Wohl CJ, Kiefer JM, Petrosky BJ*, Tiemsin PI, **Lowe KT**, Maisto PM* and Danehy PM 2015 "Synthesis of Fluorophore-Doped Polystyrene Microspheres: Seed Material for Airflow Sensing," *ACS Applied Materials & Interfaces*, 7(37), 20714-20725.
15. Petrosky BJ*, **Lowe KT**, Danehy PM, Wohl CJ and Tiemsin PI 2015 "Improvements in laser flare removal for particle image velocimetry using fluorescent dye-doped particles," *Measurement Science and Technology*, 26(11), 115303.

16. Ecker T*, **Lowe KT** and Ng WF 2015 "Eddy Convection in Developing Heated Supersonic Jets," *ALAA Journal*, 53(11), 3305-3315.
17. Cadel DR* and **Lowe KT** 2015 "Cross-correlation Doppler global velocimetry (CC-DGV)," *Optics and Lasers in Engineering*, 71, 51-61.
18. Ecker T*, **Lowe KT** and Ng W F 2015 "A rapid response 64-channel photomultiplier tube camera for high-speed flow velocimetry," *Measurement Science and Technology*, 26(2), 027001, 6pp.
19. Guillot S, Ng, W, Hamm HD Stang U and **Lowe KT** 2015 "The experimental studies of improving the aerodynamic performance of a turbine exhaust system," *ASME Journal of Engineering for Gas Turbines and Power*, 137(1), 012601, 13pp.
20. Ecker T,* Brooks DR* , **Lowe KT** and Ng W 2014 "Development and application of a point Doppler velocimeter featuring two-beam multiplexing for time-resolved measurements of high speed flow," *Experiments in Fluids*, 55, 1819-1833.
21. Blanchard R, Ng W, **Lowe KT** and Vandsburger U 2014 "Simulating Bluff Body Flameholders: On the Use of Proper Orthogonal Decomposition for Wake Dynamics Validation." *ASME Journal of Engineering for Gas Turbines and Power*, 136(12), 122603, Paper No. GTP-14-1119, 12pp.
22. **Lowe KT**, Maisto P*, Byun G, Simpson RL, Verkamp M, Danehy PM, Tiemsin PI and Wohl CJ 2013 "Laser velocimetry with fluorescent dye-doped polystyrene microspheres," *Optics Letters*, 38(8), 1197-1199.
23. **Lowe KT** and Simpson RL 2009 "An advanced laser-Doppler velocimeter for full-vector particle position and velocity measurements," *Measurement Science and Technology*, 20(4), 045402, 16pp.
24. **Lowe KT** and Simpson RL 2008 "Turbulence structural measurements using a comprehensive laser-Doppler velocimeter in two- and three-dimensional turbulent boundary layers," *International Journal of Heat and Fluid Flow*, 29(3), 820-829.
25. Tian Q, **Lowe KT** and Simpson RL 2007 "A three-velocity-component laser-Doppler velocimeter for measurements inside the linear compressor cascade," *Experiments in Fluids*, 43, 487-499.
26. **Lowe KT**, and Simpson, R L 2006 "Measurements of velocity–acceleration statistics in turbulent boundary layers," *International Journal of Heat and Fluid Flow*, 27(4), 558-565.

Articles in conference proceedings:

Note: * Indicates advisee.

1. Smith KN, O'Brien WF and **Lowe KT**, 2018 "Analysis of Duct Vortex Development with Low- and High-Fidelity Models to Support StreamVane Design," *ALAA SciTech 2018, Aerospace Sciences Meeting*, paper AIAA 2017-1558.
2. Boyda MT* and **Lowe KT**, 2018 "Cross-Correlation Doppler Global Velocimetry using Rayleigh and Mie Scattering," *ALAA SciTech 2018, Aerospace Sciences Meeting*, paper AIAA 2017-1766.
3. Moon CY*, Zhang D, **Lowe KT**, and Paterson EG, 2018 "Decomposition of periodic eddies with varying energy in a turbulent flow using a directional averaging technique," *ALAA SciTech 2018, Aerospace Sciences Meeting*, paper AIAA 2017-1765.

4. Zhang D, Cadel DR*, Paterson EG and **Lowe KT**, 2018 "Numerical Study of Transitional Unsteady Boundary Layer on Wind Turbine Airfoil Using Hybrid RANS/LES Turbulence Model," *ALAA SciTech 2018, 36th Wind Energy Symposium*, paper AIAA 2017-1497.
5. Vincent T*, Schetz J, and **Lowe KT**, 2017 "Enhanced Low-Order Model with Radiation for Total Temperature Probe Analysis and Design," SAE Technical Paper 2017-01-2047.
6. Guimarães T*, Frohnapfel DJ*, **Lowe KT** and O'Brien WF, 2017 "Development and Turbulence of a Twin-Vortex Type of Distortion for Turbofan Inlet Applications," *53rd AIAA/SAE/ASME Joint Propulsion Conference*, Atlanta, GA, paper AIAA-2017-4992.
7. Frohnapfel DJ*, **Lowe KT** and O'Brien WF, 2017 "Experimental Quantification of Fan Rotor Effects on Inlet Swirl Using Swirl Distortion Descriptors," *ASME Turbo Expo 2017*, paper GT2017-64779.
8. Guimarães T*, **Lowe KT** and O'Brien WF, 2017 "Complex Flow Generation and Development in a Full-Scale Turbofan Inlet," *ASME Turbo Expo 2017*, paper GT2017-64756.
9. Gadiraju S, Park S, Gomez D, Ekkad SV, **Lowe KT**, Moon H-K, Srinivasas R and Kim Y, 2017 "Application of Proper Orthogonal Decomposition to High Speed Imaging to Observe the Combustion Oscillations," *ASME Turbo Expo 2017*, paper GT2017-64602.
10. Vincent T*, Schetz J, and **Lowe KT**, 2017 "Analysis of Pin Fins with Radiation," *3th International Conference on Heat Transfer, Fluid Mechanics and Thermodynamics*, Portoroz, Slovenia, 17-19 July.
11. Shea SP*, **Lowe KT** and Ng WF, 2017 "Eddy Convection in Cold and Heated Supersonic Jets," *ALAA Aviation 2017*, Denver, CO, paper AIAA 2017-4044, DOI: 10.2514/6.2017-4044.
12. Mayo D*, Daniel K*, **Lowe KT** and Ng WF, 2017 "Experimental Investigation of a Heated Supersonic Jet with Total Temperature Non-Uniformity," *ALAA Aviation 2017*, Denver, CO, paper AIAA 2017-3521, DOI: 10.2514/6.2017-3521.
13. Stuber M*, **Lowe KT** and Ng WF, 2017 "Synthesis of Convection Velocity and Turbulence Measurements in Three-Stream Jets for Investigation of Noise Sources" *ALAA Aviation 2017*, Denver, CO, paper AIAA 2017-4045, DOI: 10.2514/6.2017-4045.
14. Zhang D, Cadel DR*, Paterson EG and **Lowe KT**, 2017 "Numerical and experimental study of the unsteady transitional boundary layer on a wind turbine airfoil" *ALAA SciTech 2017, 35th Wind Energy Symposium*, paper AIAA 2017-0917.
15. Frohnapfel DJ, O'Brien WF and **Lowe KT**, 2017 "Fan Rotor Flow Measurements in a Turbofan Engine operating with Inlet Swirl Distortion," *ALAA SciTech 2017, 55th ALAA Aerospace Sciences Meeting*, paper AIAA 2017-1623.
16. Guimarães Bucalo T*, Copenhaver WW, Schneck WC, **Lowe KT** and O'Brien WF, 2017 "Swirling Flow Evolution Part 1: Design and Stereo PIV Measurements at Select Planes," *ALAA SciTech 2017, 55th ALAA Aerospace Sciences Meeting*, paper AIAA 2017-1620.
17. Schneck WC, Guimarães Bucalo T*, Frohnapfel DJ, **Lowe KT**, O'Brien WF and Copenhaver WW, 2017 "Swirling Flow Evolution Part 2: Design and Stereo PIV Measurements at Select Planes," *ALAA SciTech 2017, 55th ALAA Aerospace Sciences Meeting*, paper AIAA 2017-1622.
18. Otero R*, **Lowe KT**, Ng WF, Ma L and Kim C-Y* 2016 "Non-intrusive gas turbine engine exhaust characterization using acoustic measurements," *AIAA Aviation 2016*, Washington, DC, 13-17 June, paper AIAA 2016-4160.
19. Guimarães T* and **Lowe KT** 2016 "Application of fluorescent particles for particle tracking velocimetry in wind tunnels," 18th Intl. Symposium Appl. Laser Techniques and Imaging to Fluid Mech., Lisbon, Portugal, 4-7 July, paper 4.4.1.

20. Ecker TE*, **Lowe KT** and Ng WF 2016 “Development of Doppler global velocimetry for the measurement of eddy convective velocities,” 18th Intl. Symposium Appl. Laser Techniques and Imaging to Fluid Mech., Lisbon, Portugal, 4-7 July, paper 2.2.3.
21. **Lowe KT** and Nelson CC 2016 “Fluctuating pressure gradients in heated supersonic jets,” AIAA SciTech 2016, San Diego, CA, 4-8 January, paper AIAA-2016-0003.
22. Ecker T*, **Lowe KT**, Ng W, Henderson BS, and Leib SJ 2016 “Velocity statistics and spectra in three-stream jets,” AIAA SciTech 2016, San Diego, CA, 4-8 January, paper AIAA-2016-1633.
23. Ecker T*, **Lowe KT**, and Ng W 2016 “Scale-up of the time-resolved Doppler global velocimetry technique,” AIAA SciTech 2016, San Diego, CA, 4-8 January, paper AIAA-2016-0029.
24. Cadel DR*, Shin D*, and **Lowe KT** 2016 “A hybrid technique for laser flare reduction,” AIAA SciTech 2016, San Diego, CA, 4-8 January, paper AIAA-2016-0788.
25. Guimarães T*, **Lowe KT** and O’Brien WF 2016 “An overview of recent results using the StreamVane method for generating tailored swirl distortion in jet engine research,” AIAA SciTech 2016, San Diego, CA, 4-8 January, paper AIAA-2016-0534.
26. Frohnafel DJ, Ferrar AM, Bailey J, O’Brien WF, and **Lowe KT** 2016 “Measurements of fan response to inlet total pressure and swirl distortions produced by boundary layer ingesting aircraft configurations,” AIAA SciTech 2016, San Diego, CA, 4-8 January, paper AIAA-2016-0533.
27. Frohnafel DJ, O’Brien WF, and **Lowe KT** 2015 “Fan response to inlet swirl distortions produced by boundary layer ingesting aircraft configurations,” 51st AIAA/SAE/ASEE Joint Propulsion Conference, Orlando, FL, paper AIAA-2015-3804.
28. Reardon JP*, Schneider A*, Schetz JA and **Lowe KT** 2015 “Computational modeling of radiation effects on total temperature probes,” *AIAA Aviation 2015*, 22-26 June.
29. Guimarães T*, **Lowe KT**, Nelson M*, O’Brien WF and Kirk C* 2015 “Stereoscopic PIV measurements in a turbofan engine inlet with tailored swirl distortion,” *AIAA Aviation 2015*, 22-26 June.
30. Ecker T*, **Lowe KT** and Ng W 2015 “On the distribution and scaling of convective wavespeeds in the shear layers of heated, supersonic jets,” *Turbulent Shear Flow Phenomena 9*, Melbourne, Australia, 30 June – 3 July.
31. Ecker T*, **Lowe KT** and Ng W 2015 “An experimental study of the role of core intermittency in equivalent jet noise sources,” *Turbulent Shear Flow Phenomena 9*, Melbourne, Australia, 30 June – 3 July.
32. Barboza K, Ma L, **Lowe KT**, Ekkad S and Ng W 2015 “A diagnostic technique for particle characterization using laser light extinction,” *IGTI TurboExpo 2015*, 15-19 June, Montreal, Canada, recommended for publication in *J. Engr. For Gas Turbines and Power. ASME paper GT2015-43347*.
33. Xue S, Guillot S, Ng WF, Fleming J, **Lowe KT**, Samal N and Stang U 2015 “An experimental investigation of the performance impact of swirl on a turbine exhaust diffuser/collector for a series of diffuser strut geometries,” *IGTI TurboExpo 2015*, 15-19 June, Montreal, Canada, under consideration for publication in *J. Engr. For Gas Turbines and Power. ASME paper GT2015-42325*.
34. Petrosky BJ*, Maisto PM*, **Lowe KT**, André MA, Bardet PM, Tiemsin PI, Wohl CJ and Danehy PM 2015 “Particle Image Velocimetry Applications Using Fluorescent Dye-doped

- Particles." *ALAA SciTech*, 53rd *ALAA Aerospace Sciences Meeting*, Kissimmee, FL, 5-9 January, paper AIAA 2015-1223.
35. Cadel DR*, Ecker T* and **Lowe KT** 2014 "Volumetric vector velocity measurements in a hot supersonic jet," 17th *Intl. Symposium Appl. Laser Techniques to Fluid Mech.*, Lisbon, Portugal, 7-10 July, paper 1.13.5.
 36. Brooks DR* and **Lowe KT** 2014 "Fluctuating flow acceleration in a heated supersonic jet," 17th *Intl. Symposium Appl. Laser Techniques to Fluid Mech.*, Lisbon, Portugal, 7-10 July, paper 2.7.5.
 37. Ecker T*, **Lowe KT**, Ng WF and Brooks DR* 2014 "Fourth-order spectral statistics in the developing shear layers of hot supersonic jets," *Propulsion and Energy Forum (50th ALAA/ASME/SAE/ASEE Joint Propulsion Conference)*, Cleveland, OH, 28-30 July, paper AIAA 2014-3742.
 38. Cadel D*, Ecker T* and **Lowe KT** 2014 "Time-Domain Cross-Correlation Scan DGV (CCS-DGV) for Mean-Velocity Boundary Layer Measurements," *ALAA SciTech 2014 (Proceedings of 52nd ALAA Aerospace Sciences Meeting)*, National Harbor, MD, January 13-17, paper AIAA-2014-1104.
 39. Ecker T*, Brooks D*, **Lowe KT** and Ng W 2014 "Spectral analysis of over-expanded cold jets via 3-component point Doppler velocimetry," *ALAA SciTech 2014 (Proceedings of 52nd ALAA Aerospace Sciences Meeting)*, National Harbor, MD, January 13-17, paper AIAA-2014-1103.
 40. Brooks D*, Ecker T*, **Lowe KT** and Ng W, 2014 "Experimental Reynolds Stress Spectra in Hot Supersonic Round Jets", *ALAA SciTech 2014 (Proceedings of 52nd ALAA Aerospace Sciences Meeting)*, National Harbor, MD, January 13-17, paper AIAA 2014-1227.
 41. **Lowe KT**, Byun G and Simpson RL 2014 "The effect of particle lag on supersonic turbulent boundary layer statistics," *ALAA SciTech 2014 (Proceedings of 52nd ALAA Aerospace Sciences Meeting)*, National Harbor, MD, January 13-17, paper AIAA 2014-0233.
 42. Nelson MA*, **Lowe KT**, O'Brien WF, Kirk C* and Hoopes K.M. 2014 "Stereoscopic PIV measurements of swirl distortion on a full-scale turbofan engine inlet," *ALAA SciTech 2014 (Proceedings of 52nd ALAA Aerospace Sciences Meeting)*, National Harbor, MD, January 13-17, paper 2014-0533.
 43. Guillot S, Ng W, Hamm HD, Stang U and **Lowe KT** 2014 "The experimental studies of improving the aerodynamic performance of a turbine exhaust system," *Proc. of Turbo Expo 2014*, Dusseldorf, Germany, June 16-20.
 44. Maisto PMF*, **Lowe KT**, Byun G, Simpson R, Verkamp M, Danley JE, Koh B, Tiemsin PI, Danehy PM, and Wohl CJ 2013 "Characterization of fluorescent polystyrene microspheres for advanced flow diagnostics," 43rd *ALAA Fluid Dynamics Conference*, San Diego, CA, 24-27 June, paper AIAA 2013-3168, also NASA Report number NF1676L-15707.
 45. **Lowe KT**, Byun G, Neuhart DH and Simpson RL 2013 "Auto-calibration of spatially-resolving laser-Doppler velocimeters," 51st *ALAA Aerospace Sciences Meeting*, Grapevine, TX, 7-10 January, paper AIAA 2013-0044.
 46. Blanchard R, Wickersham A, Yeaton I*, Fleischman C*, Ekkad S, Ng W, Vandsburger U, Ma L and **Lowe KT** 2013 "Test capabilities in the CCAPS/CSDL augmentor development facility," 51st *ALAA Aerospace Sciences Meeting*, Grapevine, TX, 7-10 January, paper AIAA 2013-0032.

47. **Lowe KT**, Simpson RL, and Neal TP 2012 “A laser-Doppler velocimeter system for near-field velocity vector measurements in large facilities,” *50th AIAA Aerospace Sciences Meeting*, Nashville, TN, 6-9 January, paper AIAA-2012-693.
48. Brooks D* and **Lowe KT** 2012 “Development and application of a compact spatially resolving vector laser velocimetry for near surface flow,” *16th Intl. Symp. on Appl. Laser Techniques to Fluid Mech.*, Lisbon, Portugal, 9-12 July, paper 2.12.6.
49. Yeaton I*, Maisto P* and **Lowe KT** 2012 “Time resolved filtered Rayleigh scattering for temperature and density measurements,” *28th AIAA Aerodynamic Measurement Technology, Ground Testing, and Flight Testing Conference*, New Orleans, LA, 25-28 June, paper AIAA-2012-3200.
50. **Lowe KT**, Ng W and Ecker T* 2012 “Early development of time-resolved volumetric Doppler velocimetry for new insights in hot supersonic jet noise,” *18th AIAA/CEAS Aeroacoustics Conf.*, Colorado Springs, CO, 4-6 June, paper AIAA-2012-2273.
51. Ecker T, **Lowe KT** and Simpson RL 2012 “Novel laser Doppler acceleration measurements of particle lag through a shock wave,” *50th AIAA Aerospace Sciences Meeting*, Nashville, TN, 6-9 January, paper AIAA-2012-694.
52. Tian QT, **Lowe KT** and Simpson RL 2010 “A laser-based optical approach for measuring scour depth around hydraulic structures,” *5th Intl. Conf. on Scour and Erosion*, San Francisco, CA, 7-10 November.
53. **Lowe KT** and Simpson RL 2008 “A sub-miniature laser-Doppler velocimeter for high speed flow measurements,” *14th Intl. Symp. on Applications of Laser Techniques to Fluid Mechanics*, Lisbon, Portugal, 7-10 July, Paper 1292.
54. **Lowe KT** and Simpson RL 2007 “Turbulence structural measurements using a comprehensive laser-Doppler velocimeter in two- and three-dimensional turbulent boundary layers,” *5th Int. Symp. on Turb. Shear Flow Phenom.*, Garching, Germany, 27-29 August.
55. **Lowe KT** and Simpson RL 2007 “Doppler chirp signal processing for particle acceleration measurement with laser-Doppler velocimetry,” *proc. 14th Coherent Laser Radar Conf.*, Snowmass, CO, 9-13 July.
56. **Lowe KT** and Simpson RL 2005 “Measurements of velocity-acceleration statistics in turbulent boundary layers,” *4th Intl. Symp. on Turb. Shear Flow Phenom.*, Williamsburg, VA, 27-29 June.

Book chapters:

1. **Lowe KT**, Bradner M and Emerson LP 2017 “Flow-rate measurement,” *AccessScience*, McGraw Hill Education, New York, <https://doi.org/10.1036/1097-8542.261700>.

Patents

Allowed:

1. Simpson, R.L. Lowe, K. T., Tian, Q. Q. “Low drag asymmetric tetrahedral vortex generators,” US Patent 8434723.
2. Simpson, R.L. Lowe, K. T., Tian, Q. Q. “Bridge pier and abutment scour preventing apparatus with vortex generators,” US Patent 8348553.

Pending:

1. Lowe, K.T., Ng, W.F., and Otero, R. “Acoustic anemometer for high speed flows,” US Patent Application 8434723.
2. Frohnäpfel, D., O’Brien, W.F., and Lowe, K.T. “A flow distortion generator for combined swirl and pressure distortion,” US Patent Pending.

Funded research projects

Summary: \$9M (\$5M credited share)

1. “Velocity Profile Measurement,” Rolls-Royce Corporation, Maximum Amount: USD 39,772, Amount Awarded to Date: USD 39,772, Principal Investigators: Lowe Kevin T (50%), Ng Wing Fai (50%), Lowe K; Ng WF, 09/01/2017-12/31/2017.
2. “SBIR: Distributed Anemometry via High-Definition Fiber Optic Sensing”, Luna Innovations Inc, National Aeronautics & Space Administration, USD 35,000, Principal Investigators: Lowe Kevin T (100%), 07/01/2017-12/01/2017
3. “Temperature sensors,” Pratt & Whitney Corporation, Maximum Amount: USD 108,000, Amount Awarded to Date: USD 108,000, Principal Investigators: Lowe Kevin T (67%), Schetz Joseph A (33%), Lowe K; Schetz J, 05/01/2017-12/31/2017
4. “Streamvane Research with NASA Glenn Research Center”, Vantage Partners LLC, National Aeronautics & Space Administration, USD 176,025, Principal Investigators: Lowe Kevin T (50%), O-Brien Walter F (50%), 05/24/2017-11/30/2017
5. “NASA Unitary Plan Wind Tunnel DGV Test”, National Institute of Aerospace, National Aeronautics & Space Administration, USD 106,001, Principal Investigators: Lowe Kevin T (100%), 04/20/2017-09/25/2017
6. “System Manufacturing and Testing”, Rolls-Royce Corporation, USD 202,893, Principal Investigators: Lowe Kevin T (50%), O-Brien Walter F (50%), 03/01/2017-10/27/2017
7. “2017 Non-contact Thrust Measurement, Rolls-Royce Corporation”, USD 209,300, Principal Investigators: Ekkad Srinath (25%), Lowe Kevin T (25%), Ma Lin (25%), Ng Wing Fai (25%), 01/01/2017-12/31/2017
8. “PIV Technology Development for High Value Flow Duct and Rig Measurements”, Pratt & Whitney Corporation, USD 189,817, Principal Investigators: Lowe Kevin T (100%), 01/01/2017-12/31/2017
9. “Modeling and improving thermocouple sensor performance in the presence of large temperature gradients”, Pratt & Whitney Corporation, USD 125,000, Principal Investigators: Lowe Kevin T (50%), Schetz Joseph A (50%), 01/01/2017-12/31/2017
10. “Inlet Particle Mass Sensor”, Rolls-Royce Corporation, USD 260,000, Principal Investigators: Ekkad Srinath (25%), Lowe Kevin T (25%), Ma Lin (25%), Ng Wing Fai (25%), 01/01/2017-12/31/2017
11. “TFE731 INSTALL FOR INLET DISTORTION PROJECT”, Honeywell Aerospace, USD 150,000, Principal Investigators: Lowe Kevin T (50%), O-Brien Walter F (50%), 10/01/2016-05/31/2017
12. “Support Hot Film Testing”, Rolls-Royce Corporation, USD 21,424, Principal Investigators: Lowe Kevin T (100%), 09/20/2016-12/20/2016
13. “Using Low-order Models for Thermocouple Sensor Design Uncertainties”, Pratt & Whitney Corporation, USD 25,000, Principal Investigators: Lowe Kevin T (50%), Schetz Joseph A (50%), 08/15/2016-12/31/2016
14. “Evaluation and Testing,” Rolls-Royce Corporation, \$406,830, 3/1/2016 – 12/31/2016, Candidate’s Role: P.I., 50% credit, co-P.I.: W. F. O’Brien (50%).

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15. “RR-VT Diagnostics Development: A joint effort towards advanced diagnostics tools,” Rolls-Royce Corporation, \$291,000, 1/1/2016 – 12/31/2016, Candidate’s Role: co-P.I., 25% credit, P.I.: S. Ekkad (25%), co-P.I.’s: W. Ng (25%), L. Ma (25%).
16. “SBIR: Filtered Rayleigh scattering approach for multi-property flow measurement in tactical aircraft inlets,” Prime Photonics, \$35,000, 6/1/2016 – 5/31/2017, Candidate’s Role: P.I., 100% credit.
17. “Total Temperature Probe Design Support,” Pratt & Whitney Center of Excellence, \$100,000, 1/1/2016-12/31/2016, Candidate’s Role: P.I., 50% credit, co-P.I.: J. Schetz (50%).
18. “PIV Application Development,” Pratt & Whitney Center of Excellence, \$164,999, 1/1/2016 – 12/30/2016, Candidate’s Role: P.I., 100% credit.
19. “Turbulence Development in Non-Uniform Supersonic Jets for Supersonic Jet Noise Reduction,” ONR, \$517,749, 6/1/2016 – 5/30/2018, Candidate’s Role: P.I., 50% credit, co-P.I.: W. Ng (50%).
20. “US-Denmark Collaboration in Wind Energy: Workshop on a Vision for Wind Energy Research and Education,” NSF, \$35,125, 8/1/2015 – 7/31/2016, P.I., 50% credit, co-P.I.: W. Devenport (50%).
21. “Time-Resolved Doppler Global Velocimetry for Full-Scale Plume Characterization,” ONR DURIP, \$220,250, 8/1/2015 – 7/31/2016, Candidate’s Role: P.I., 50% credit, co-P.I.: W. Ng (50%).
22. “Advanced Validation Testing for High Temperature Flow Sensors,” Pratt & Whitney Center of Excellence, \$45,000, 6/1/2014 – 12/31/2014, Candidate’s Role: P.I., 45% credit, co-P.I.s: J. Schetz (45%), W. O’Brien (10%)
23. “Turbine Engine Vortex Ingestion Research,” NIA/NASA cooperative agreement, \$227,683, 5/1/2015 – 12/31/2016, Candidate’s Role: co-P.I., 50% credit, P.I.: W. F. O’Brien (50%).
24. “Support of Skin Friction Testing in the Virginia Tech Supersonic Wind Tunnel,” ISSI, Inc., \$6,000, 5/1/2014 – 12/31/2014, Candidate’s Role: P.I., 100% credit
25. “VT Response to Wyle RFQ: Naval Air Technical Information Systems Interoperability & Reliability Airworthiness Products,” Wyle Aerospace Group, \$519,950, 10/1/2014 – 6/20/2016, Candidate’s Role: co-P.I., 16% credit, P.I.: B. Canfield (32%), co-P.I.’s: M. Farhood (20%), L. McCue-Weil (16%), C. Woolsey (16%)
26. “PIV Characterization of Compressor Inlet Distortion,” Spectral Energies, LLC, \$19,967, 11/1/2014 – 6/1/2015, Candidate’s Role: P.I., 100% credit.
27. “Total Temperature Probe Design Space Extension Statement of Work 2015” Pratt & Whitney Center of Excellence, \$140,000, 1/1/2015 – 12/31/2015, Candidate’s Role: P.I., 50% credit, co-P.I.: J. Schetz (50%).
28. “Near field velocity measurement system for wind tunnel testing: Test 1,” AUR, Inc., \$16,000, 1/1/2015 – 5/31/2015, Candidate’s Role: P.I., 100% credit.
29. “3D Endwall Cascade Testing,” Honeywell Aerospace, \$150,000, 1/1/2015 – 12/31/2015, Candidate’s Role: co-P.I., 33% credit, P.I.: Wing Ng (34%), co-P.I.: Srinath Ekkad (33%)
30. “PIV Capability Investigation,” Pratt & Whitney Center of Excellence, \$20,000, 3/1/2015 – 12/31/2015, Candidate’s Role: P.I., 100% credit.
31. “RR-VT Diagnostics Development: A joint effort towards advanced diagnostic tools,” Rolls-Royce Corporation, \$289,998, 1/1/2015 – 12/31/2015, Candidate’s Role: co-P.I., 25% credit, P.I.: S. Ekkad (25%), co-P.I.’s: L. Ma (25%), W. Ng (25%)

32. “Turbine Engine Vortex Ingestion Research,” NIA/NASA cooperative agreement, \$227,629, 5/1/2014 – 4/30/2015, Candidate’s Role: co-P.I., 50% credit, P.I.: W. F. O’Brien (50%).
33. “2014 Technology Tests - Phase 1,” GE Power and Water, \$203,975, 1/1/2014 – 12/15/2014, Candidate’s Role: co-P.I., 25% credit, P.I.: A. Borgoltz (25%), co-P.I.’s: W.J. Devenport (25%), N. Intratep (25%).
34. “2014 Technology Tests - Phase 2,” GE Power and Water, \$148,696, 1/1/2014 – 12/15/2014, Candidate’s Role: co-P.I., 25% credit, P.I.: A. Borgoltz (25%), co-P.I.’s: W.J. Devenport (25%), N. Intratep (25%).
35. “RR-VT Diagnostics Development: A joint effort towards advanced diagnostic tools,” Rolls-Royce Corp., \$290,000, Candidate’s Role: co-P.I., 25% credit, P.I.: S. Ekkad (25%), co-P.I.’s: L. Ma (25%) and W. Ng (25%).
36. “HPT Total Temperature Design System Update,” Pratt & Whitney, \$125,000, 1/1/2014 – 12/31/2014, Candidate’s Role: P.I., 45% credit, co-P.I.’s: J. Schetz (45%) and W.F. O’Brien (10%).
37. “Providing LDV Equipment and Support,” Applied University Research, Inc., \$5000, 10/31/2013 – 7/31/2014, Candidate’s Role: P.I., 100% credit.
38. “Time-Resolved Volumetric Doppler Velocimetry (TRVDV) development and experiments for hot supersonic jet aeroacoustics,” Office of Naval Research, \$202,138, 10/1/2013 – 9/30/2014, Candidate’s Role: P.I., 100% credit, co-I.: W. Ng.
39. “Fluorescence-Doped Particles for Simultaneous Temperature and Velocity Imaging,” NIA/NASA cooperative agreement, \$70,000, 8/1/2013 – 7/31/2014, Candidate’s Role: P.I., 100% credit.
40. “Total temperature/total pressure probe optimization,” Pratt & Whitney, \$86,574, 5/1/2013 – 4/30/2014, Candidate’s Role: P.I., 90% credit, co-P.I.: W.F. O’Brien (10%).
41. “Turbine Engine Vortex Ingestion Research,” NASA/National Institute of Aerospace, \$223,382, 5/1/2013 – 4/30/2014, Candidate’s Role: co-P.I., 50% credit, P.I.: W.F. O’Brien (50%).
42. “Rolls-Royce – VT Diagnostics Development – A joint effort towards advanced diagnostics tools,” Rolls-Royce Corporation, \$175,000, 1/1/2013– 12/31/2013, Candidate’s Role: co-P.I., 20% credit, P.I.: S. Ekkad (20%), co-P.I.’s: W. Ng (20%), L. Ma (20%), U. Vandsburger (20%).
43. “Advanced flow measurement diagnostics for wind turbine blade testing in the Virginia Tech Stability Wind Tunnel,” GE Energy, \$159,585, 1/1/2013 – 12/15/2013, Candidate’s Role: co-P.I., 34% credit, P.I.: A. Borgoltz (33%), co-P.I.: W.J. Devenport (33%).
44. “Laser for high resolution boundary layer measurements,” GE Energy, \$66,000, 10/19/2012 – 12/20/2012, Candidate’s Role: P.I., 33% credit, co-P.I.’s: A. Borgoltz (34%), W.J. Devenport (33%).
45. “Phase II Proposal: Fluorescence-doped particles for simultaneous temperature and velocity imaging,” NASA/National Institute of Aerospace, \$49,300, 8/1/2012 – 7/31/2013, Candidate’s Role: P.I., 100% credit.
46. “Augmentor Development – A joint effort towards next generation Augmentor design,” Rolls-Royce, \$218,419, 6/1/2011 – 12/31/2011, Candidate’s Role: co-P.I., 20% credit, P.I.: S. Ekkad (20%), co-P.I.’s: W. Ng, D. Tafti (20%), U. Vandsburger (20%).

47. “Fluorescence-Doped Particles for Simultaneous Temperature and Velocity Imaging,” National Institute of Aerospace, \$30,000, 1/1/2012 – 6/30/2012, Candidate’s Role: P.I., 100% credit.
48. “Providing SPIV Equipment and Support,” Techsburg, Inc., \$10,000 (incremented funding), 5/1/2011-12/31/2011, Candidate’s Role: P.I., 100% credit.
49. “Augmentor Development – a joint effort towards next generation Augmentor design,” Rolls-Royce, \$300,000, 1/1/2012-12/1/2012, Candidate’s Role: co-P.I., 20% credit, P.I.: S. Ekkad, co-P.I.: W. Ng (20%),L. Ma (20%), U. Vandsburger (20%).
50. “Vortical flow characterization in a gas turbine diffuser,” Techsburg, Inc., \$70,000, 1/1/2012-12/31/2012, Candidate’s Role: P.I., 100% credit.
51. “Turbine Engine Vortex Ingestion Research,” National Institute of Aerospace, \$212,672, 5/15/2012 – 5/14/2012, Candidate’s Role: co-P.I., 50% credit, P.I.: Walter O’Brien (50%).
52. “Comprehensive laser diagnostics towards hot supersonic jet noise reduction,” Office of Naval Research DURIP, \$283,243, 6/15/2012-6/14/2013, Candidate’s Role: P.I., 100% credit.
53. “Laser-Doppler velocimetry measurements of flows near metal rubber skin friction sensors,” NanoSonic, Inc., \$15,000, 5/15/2011-3/15/2012, Candidate’s Role: P.I., 100% credit.
54. “Demonstration of a 16 simultaneous point, spatio-temporally resolved flow thermometry technique for high-speed flow research,” Virginia Space Grant Consortium, \$10,000, 9/1/2011-8/31/2012, Candidate’s Role: P.I., 100% credit.
55. “Time-resolved volumetric Doppler velocimetry development and experiments for volumetric flow-field aeroacoustics correlations in square supersonic jets,” Office of Naval Research, \$257,000, 8/1/2011 – 7/31/2013, Candidate’s Role: P.I., 100% credit, co-I: W. Ng.
56. “Providing SPIV Equipment and Support,” Techsburg, Inc., \$20,000, 5/1/2011 – 5/30/2012, Candidate’s Role: P.I., 100% credit.
57. “AF Topic F071-345-1513 – Near Field Velocity Measurements for Wind Tunnels”. Air Force, Small Business Innovation Research (SBIR), Phase II, \$553,049, March 2009 – March 2011, Candidate’s Role: P.I.
58. “Testing Artificial Haircell sensors in the Applied University Research Inc. Water Channel Facility”. Sub-award through DARPA BioSenSE program. \$20,000, March-June 2009, Candidate’s Role: P.I.
59. “AF Topic F071-345-1513 – Near Field Velocity Measurements for Wind Tunnels”. Small Business Innovation Research (SBIR), Phase I, \$77,747, April 2007 - April 2008, Candidate’s Role: P.I.

Instruction

His teaching portfolio includes undergraduate and graduate courses in propulsion and fluid dynamics. Core to his teaching philosophy for these courses is providing an atmosphere in which students may learn incrementally, often involving recurring technical themes, from out-of-class assignments that are informed by content delivery and examples available in the classroom and online. In each class taught, course technology such as slide screen recording, Web-based assessments, and WebEx lecture/recitation delivery, has enhanced the effectiveness and availability of the course content.

Courses Taught

- AOE/ME 4234 Aerospace Propulsion Systems
Six semesters taught: Fall 2011 – 2017
Average Enrollment: 138 students, Average Student Evaluation: 5.1/6.0
- AOE 5154: Data Analysis in Fluid Dynamics
Two semesters taught: Spring 2015-2018
Average Enrollment: 11, Average Student Evaluation: 5.50/6.0.
- AOE 6114 Transonic Aerodynamics
Three semesters taught: Spring 2012, 2014, 2016
Average Enrollment: 8, Average Student Evaluation: 5.0/6.0
- AOE 4984 SS: Aero Engine Design Modeling
Two semesters taught: Spring 2012, Spring 2013
Enrollment: 10, 12, Average Student Evaluation: 5.7/6.0
- AOE/ME 5135 Vehicle Propulsion
One semester taught: Fall 2014, 2017
Enrollment: 18, Evaluation: 5.5/6.0

Courses Developed

- AOE 5154 Data Analysis in Fluid Dynamics: 3 credit hour graduate course covering data analysis techniques and their role in fluid dynamics research.
- AOE 3164 Aerothermodynamics and Propulsion Systems: 3 credit hours undergraduate course on fundamental principles of aerothermodynamics applied to aerospace propulsion system performance analysis and design.