Qiuying Zhao, PhD

Assistant Professor
Department of Engineering Technology
University of Toledo
2801 West Bancroft Street, MS 402
The University of Toledo
Toledo, Ohio 43606
Tel: (419) 530-3239
Email: qiuying.zhao@utoledo.edu

EDUCATION

University of Toledo Department of Mechanical, Industrial, and Manufacturing Engineering Mechanical Engineering Toledo, Ohio, USA	Dec. 14, 2012	Doctor of Philosophy
Mississippi State University High Performance Computing Collaboratory Computational Engineering Mississippi, USA	Dec. 11, 2009	Master of Science
Beihang University (Previous known as Beijing University of Aeronautics and Astronautics) School of Jet Propulsion Fluid Machinery and Engineering Beijing, China	Mar. 20, 2005	Master of Science
Northwestern Polytechnical University Department of Aeroengine & Thermal Power Power Engineering for Aerospace Vehicle Xi'an, Shaanxi, China	July 1, 2002	Bachelor of Science

WORKING EXPERIENCE

Assistant Professor Department of Engineering Technology The University of Toledo Toledo, Ohio, USA	August 2019- present
Visiting Assistant Professor Department of Engineering Technology The University of Toledo	September 2017- August 2019

Toledo, Ohio, USA
Part-Time Instructor January 2017- August 2017
Department of Engineering Technology
The University of Toledo
Toledo, Ohio, USA

Research Associate January 2013 – December 2016
Department of Mechanical Engineering
The University of Toledo
Toledo, Ohio, USA

TEACHING EXPERIENCE

MET 1020 - Technical Drawing
MET 1250 - Computer Aided Drafting and Design
MET 2050 - Fluid & Hydraulic Mechanics
MET 2210 - Technical Thermodynamics
MET 2350 - Advanced Computer Aided Drafting and Design
ENG 3020 - Applied Engineering Mathematics
MET 4100 - Applied Fluid Mechanics

RESEARCH INTERESTS

Computational Fluid Dynamics
Higher-Order Schemes
Grid Deformation Methods
Rotorcraft Aerodynamics
Ducted Fans and Turbomachinery
Active Flow Control
Large Eddy Simulation

PROFESSIONAL MEMBERSHIP

Senior Member of the American Institute of Aeronautics and Astronautics (AIAA)
Member of the American Helicopter Society International (AHS)
Member of American Society for Engineering Education (ASEE)

PATENT

- Sheng, C., and Zhao, Q., "Active Flow Control in Ducted Fans and Fan-In-Wing Configurations," U.S. D2016-66 Provisional Patent Application (1-57922) filed on May 20, 2016.

JOURNAL ARTICLES

- Sheng, C. and Zhao, Q, "Improving Predictions of Transitional and Separated Flows Using RANS Methods" submitted to *Computers & Fluids,* under review, July, 2019.
- Sheng, **C.,** Zhao, Q., and Wang J., (2018) "A Strategy for Predicting Transition and Separation Using Eddy Viscosity Turbulence Models," submitted to *Computers & Fluids,* under review, November 2018.

- Sheng, **C.**, Zhao, Q., and Hill, M. (2018) "Computational Investigation of a Full-Scale Proprotor Hover Performance and Flow Transition," *Journal of Aircraft*, Vol. 55, No. 1, pp. 122-132. https://doi.org/10.2514/1.C034015.
- Sheng, C., and Zhao, Q., "Numerical Investigations of Fan-In-Wing Aerodynamic Performance with Active Flow Control," Journal of Aircraft, Vol. 54, No. 6 (2017), pp. 2317-2329, https://doi.org/10.2514/1.C034134.
- Sheng, C., Wang, J. and Zhao, Q., "Improved Rotor Hover Predictions Using Advanced Turbulence Modeling," *Journal of Aircraft*, Vol. 53, No. 5 (2016), pp. 1549-1560, https://doi.org/10.2514/1.C033512.
- Zhao, Q., Sheng, C., and Afjeh, A., "Computational Aerodynamic Analysis of Offshore Upwind and Downwind Turbines," *Journal of Aerodynamics*, Volume 2014 (2014), Article ID 860637, 29 October 2014.
- Sheng, C, Wang, X., and Zhao, Q., "Aerodynamic Analysis of a Spinning Missile Using a High Order Unstructured Grid Scheme," *Journal of Spacecraft and Rockets*, ISSN: 0022-4650, Vol. 47, No. 1, Jan-Feb 2010, pp. 81-89.
- Yan, M., Zhao, Q., and Liang, L., "Application of preconditioning method in 3D numerical simulation of turbomachinery," *Journal of Aerospace Power*, January 2007, Vol. 22, No. 1, pp 41-47.

CONFERENCE PROCEEDINGS

- Sheng, C., Zhao, Q., and Baugher, S., (2019) "Numerical Investigation of Rotor Aerodynamics Using High-Order Unstructured Grid Schemes," Special Session: Rotor-in-Hover Simulations I, accepted for presentation at the 2020 AIAA SciTech Forum, Orlando, Florida, 6-10 January 2020.
- Sheng, C., Zhao, Q., Zhong, D., and Ge, N., "A Strategy to Implement High-Order WENO Schemes on Unstructured Grids," AIAA 2019-2955, 2019 AIAA Aviation and Aeronautics Forum and Exposition, Dallas, Texas, 17-21 June 2019. https://doi.org/10.2514/6.2019-2955.
- Zhao, Q., Baugher, S., and Sheng, C., (2019) "NASA PSP Rotor Hover Simulation with Fuselage Effect," AIAA-2019-0594, AIAA SciTech 2019 Forum, 7-11 January 2019, San Diego, California
- Sheng, C., Zhao, Q., and Wang, J. (2018) "Numerical Investigation of Boundary Layer Transition on Hovering Rotor," 30th International Conference on Parallel Computational Fluid Dynamics, 14-17 May 2018, Indianapolis, Indiana
- Sheng, C., Schindler, R., Baugher, S., and Zhao, Q. (2018) "Transition Modeling and Prediction Using an Unstructured Grid RANS CFD Code," AIAA-2018-1042, 56th AIAA Aerospace Sciences Meeting, AIAA SciTech, 8-12 January 2018, Kissimmee, Florida
- Zhao, Q., Wang, J., and Sheng, C, "Numerical Simulations and Comparisons of PSP and S-76 Rotors in Hover," presented at 2018 AIAA SciTech Forum, Kissimmee, Florida, January 8 – 12, 2018.
- Sheng, C., Zhao, Q., Al-Khalifin, Y., and Afjeh, A., "Aeromechanical Analysis of Two-Bladed Downwind Turbine Using a Nacelle Tilt Control," ASME 2017 Fluids Engineering Division Summer Meeting, paper No. FEDSM2017-69585, pp. V01BT11A029, 12 pages, doi:10.1115/FEDSM2017-69585, Waikoloa, Hawaii, USA, July 30–August 3, 2017, ISBN: 978-0-7918-5805-9.

- Sheng, C., and Zhao, Q., "Computational Aerodynamic Analysis of Downwind Turbine Using a New Tilt Control Concept," ASME 2017 Fluids Engineering Division Summer Meeting, paper No. FEDSM2017-69586, pp. V01BT11A030, 11 pages, doi:10.1115/FEDSM2017-69586, Waikoloa, Hawaii, USA, July 30–August 3, 2017, ISBN: 978-0-7918-5805-9.
- Sheng, C., and Zhao, Q., "Numerical Investigation of Active Flow Control for Fan-In-Wing Configuration in Forward Flight," 23rd AIAA Computational Fluid Dynamics Conference, AIAA AVIATION Forum, (AIAA 2017-3959), https://doi.org/10.2514/6.2017-3959, Denver, Colorado, June 5 -9, 2017.
- Sheng, C., and Zhao, Q., "Assessment of Transition Models in Predicting Skin Frictions and Flow Field of a Full-Scale Tilt Rotor in Hover," American Helicopter Society 72nd Annual Forum, West Palm Beach, Florida, May, 2016.
- Sheng, C., Zhao, Q., and Hill, M., "Investigations of XV-15 Rotor Hover Performance and Flow Field Using U2NCLE and HELIOS Codes," 54th AIAA Aerospace Sciences Meeting, San Diego, Califonia, January 4-8, 2016.
- Zhao, Q. and Sheng, C., "Numerical Investigation and Validation of Open Fan Hover Performance," 33rd AIAA Applied Aerodynamics Conference, Dallas, Texas, June 22-26, 2015.
- Sheng, C., Wang, J., and Zhao, Q., "S-76 Rotor Hover Predictions Using Advanced Turbulence Models," AIAA Science and Technology Forum 2015: Applied Aerodynamics, Kissimmee, Florida, January 5-9, 2015.
- Sheng, C., Zhao, Q., and Bi, N., "Numerical Investigations of Ducted Fan Hover Performance for Fan-In-Wing Applications," 53rd AIAA Aerospace Sciences Meeting, Kissimmee, Florida, January 5-9, 2015.
- Sheng, C., Zhao, Q., and Bi, N., "Computational Analysis of Lift Fan Hover Efficiency," 2014/12, AHS 8th Australian Pacific Vertiflite Conference on Helicopter Technologies and 3rd Asian-Australian Rotorcraft Forum
- Ickes, J., Zhao, Q., and Wang, J., and Sheng, C., "Coupled CFD/CSD Simulations of the UH-60A Main Rotor in High Thrust Forward Flight," 44th AIAA Fluid Dynamics Conference, AIAA 20142772, Atlanta, Georgia, June 16-20, 2014.
- Zhao, Q., Ickes, J., Sheng, C., and Afjeh, A., "Numerical Investigations of Upwind and Downwind NREL 5MW Reference Wind Turbines Using CFD and CSD," AHS 70th Annual Forum and Technology Display, Montréal, Quebec, Canada, May 20-22, 2014, SKU #: 70-2014-0105.
- Ickes, J., Wang, J., Zhao, Q., and Sheng, C., "Coupled CFD/CSD Simulations of Helicopter Rotors with a Free Wake Model," AIAA Science and Technology Forum and Exposition 2014: 52nd Aerospace Sciences Meeting, Session: APA-33, Aerodynamic-Structural Dynamics Interaction, National Harbor, MD, January 13-17, 2014.
- Sheng, C., Zhao, Q., and Wang, J., "S-76 Rotor Hover Prediction Using U2NCLE Solver," AIAA 2014-0044, AIAA Science and Technology Forum and Exposition 2014: 52nd Aerospace Sciences Meeting, Session: APA-02, Simulation of Rotor in Hover (Invited) I, National Harbor, MD, January 13-17, 2014.
- Sheng, C., Ickes, J., Wang, J., and Zhao, Q., "CFD/CSD Coupled Simulations of Helicopter Rotors in Forward and Maneuver Flight," 31th AIAA Applied Aerodynamics Conference,

San Diego, California, Jun 24-27, 2013.

- Sheng, C., Zhao, Q., Narramore, J., and Ickes, J., "Loosely Coupled CFD/CSD Simulations of Helicopter Rotors in Forward Flights," Presented at the American Helicopter Society 69th Annual Forum, Phoenix, Arizona, May 21-23, 2013, SKU#: 69-2013-318.
- Zhao, Q. and Sheng, C., "Evaluation of Higher Order Improvement of Unstructured Schemes for Helicopter Rotor Simulations," AIAA-2012-2901, 30th AIAA Applied Aerodynamics Conference, New Orleans, Louisiana, June 25-28, 2012, https://doi.org/10.2514/6.2012-2901.
- Zhao, Q. and Sheng, C., "Improvements of High-Order Unstructured Grid Schemes Through RBF Interpolation-II," AIAA-2012-727, 50th AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition, Nashville, Tennessee, Jan. 9-12, 2012.
- Sheng, C., Su, X., Zhao, Q., Bridgeman, J., and Narramore, J. (Bell Helicopter Textron), "A Hybrid CFD Method for Helicopter Rotors with Mesh Deformation," Presented at the American Helicopter Society Specialists' Meeting Next Generation Vertical Lift Technologies, Fort Worth, Texas, February 23-25, 2011, SKU#: sm_2011_ngvl_015_ sheng.
- Zhao, Q. and Sheng, C., "Improvements of High-Order Unstructured Grid Schemes Through RBF Interpolation," AIAA-2011-3856, 20th AIAA Computational Fluid Dynamics Conference, Honolulu, Hawaii, June 27-30, 2011.
- Sheng, C., Zhao, Q., Rajmohan, N., Sankar, L., Bridgeman, J., and Narramore, J.,"An Unstructured Hybrid CFD Approach for Computing Rotor Wake Flows," AIAA-2011-1124, 49th AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace, Exposition, Orlando, Florida, Jan. 4-7, 2011.
- Sheng, C. and Zhao, Q., "Application and Validation of High-Order Unstructured Grid Schemes to Vortex-Dominant Flows," 66th American Helicopter Society Annual Forum, Phoenix, Arizona, 11-13 May 2010, SKU 6602010-000374.
- Sheng, C., Wang, X., and Zhao, Q., "Simulation and Validation of a Marine propeller 5168 WITH AN arbitrary Mach number scheme," ISROMAC12-2008-20213, The 12th International Symposium on Transport Phenomena and Dynamics of Rotating Machinery, Honolulu, Hawaii, February 17-22, 2008.
- Sheng, C. and Zhao, Q., "Conjugate Heat Transfer Prediction of an Effusion Cooled Plate," AIAA-2007-4032, 39th AIAA Thermophysics Conference, Miami, Florida, June 25-28, 2007.
- Zhao, Q., Yan, M., Zou, Z., and Hu, G., "The effects of Low Reynolds number to the performance of fans and the relevant design optimizations", The Fifth Astronautic Power Annual meeting, (3) Turbomachinery Fascicule, P73-P80, 2002, Beijing.

EDUCATION CONFERENCE PROCEEDINGS

- Cioc, C., Zhao, Q., and Cioc, S., "Combining Simulation and Experiment to Determine Fluid Forces in the Fluid Mechanics Laboratory", Presented at 2019 ASEE Annual Conference and Exposition, June 16-19, 2019, Tampa, Florida.