

## Mark N. Callender

### Education

The University of Tennessee Space Institute, Tullahoma, TN  
2006 - 2013

- Doctor of Philosophy
- Major in Engineering Science
- Concentration in Thermal-Fluid Mechanics
- Doctoral research on aerodynamic efficiency of rotating biquadratic bodies of revolution (BBOR)

The University of Tennessee Space Institute, Tullahoma, TN  
2000 - 2003

- Master of Science
- Major in Aviation Systems
- Masters research on integration of hands on throttle and stick (HOTAS) controls in general aviation aircraft
- Specific training in Flight Test Engineering

Middle Tennessee State University, Murfreesboro, TN  
1996 - 1999

- Bachelor of Science
- Major in Aerospace Technology
- Minors in Mathematics and Engineering Technology and Industrial Studies

### Appointments

Professor of Aerospace  
2005 - Present Middle Tennessee State University, Murfreesboro, TN

- Associate Department Chair, 2020 - Present
- Incorporate mathematics, physics and engineering into the Aerospace curriculum primarily through AERO 1020, 3440, 4071, 4440, & 6611
- Mentor undergraduate students through research projects in AERO 4071
- Mentor graduate students through thesis and capstone research projects
- Coordinate the Technology Concentration which prepares students for graduate education in an engineering discipline
- Provide recommendations for qualified students seeking admission to graduate school
- Perform research in various areas independently and with faculty/student teams
- Serve on and Chair various Department, College and University Committees
- Graduate, Experiential Learning, and Honors Faculty
- Created and operates the Aerospace Technology Laboratory
- Provide instruction in the Aerospace Department's Basic Summer Camp
- Developed the Aerospace Department's Aerodynamics Advanced Camp

Instructor of Mathematics  
2001 - 2005 Dyersburg State Community College, Dyersburg, TN

- Instructed College and Developmental mathematics

- Coordinated and trained adjunct mathematics faculty
- Served as a Master Advisor
- Served on various Departmental and College committees

#### Aerospace Engineer

2001 - 2001 Titan Aerospace, Fort Rucker, AL

- Determined data requirements for instrumentation of an AH-64D Longbow Apache flight test aircraft
- Authored test plans, reports and other technical memoranda in support of developmental testing of U.S. Army flight test aircraft
- Performed Flight Test Engineer duties to include the determination of flight test data requirements, the monitoring of real time data, and the reduction and presentation of the data

## Outreach

#### Aerospace Technology Laboratory Demonstrations

2013-present

Provided introduction to aerodynamic ground test equipment (wind tunnels, water tunnels, CFD software, etc.) for groups to include: Aerospace Department alumni, Columbian government officials, United Arab Emirates student group, Hobgood Elementary School's Extended School (ESP) program, and Rutherford County School's Summer K-6 STEM Camp.

#### Cason Lane Academy Rocket Lab

2022

Presented topics pertaining to aviation, rocketry, and my career to the 5<sup>th</sup> grade classes at Cason Lane Academy.

#### Science National Honor Society at Central Magnet School

2022

Presented topics pertaining to my career and education as well as a lesson and demonstration of Bernoulli's principle.

#### Overall Creek Elementary

2021

Presented topics pertaining to gravity, friction, momentum, drag, experimentation, and aerospace engineering careers to the 2<sup>nd</sup> grade classes at Overall Creek Elementary.

#### Erma Seigel Elementary

2020

Presented on careers in the aerospace industry to the 5<sup>th</sup> grade classes at Erma Seigel Elementary.

#### Central Magnet School's Calculus Classes

2018-2019

Presented topics pertaining to aerospace engineering to magnet high school students who were enrolled in calculus courses.

#### Civil Air Patrol E-Tech Camp

2017-2019

Instructor for E-Tech National summer camp for 9<sup>th</sup>-12<sup>th</sup> grade Civil Air Patrol cadets interested in pursuing engineering education.

Primary areas of instruction include aerodynamics, propeller testing, and data visualization.

MTSU Aerospace Summer Camp Instructor

2012-2019

Instructor for MTSU Aerospace Department summer camps for 8<sup>th</sup> - 12<sup>th</sup> grade students. Primary areas of instruction include aerodynamics, aircraft design, and ground and flight testing.

Central Magnet Senior Thesis Mentor

2012-2020

Provided instruction and guidance to senior magnet high school students on topics to include CFD, aviation curricula, and morality.

Central Magnet School's Engineering Club Speaker

2011

Presented topics pertaining to aerospace engineering to magnet high school students who are participating in the school's engineering club.

Homer Pittard Campus School's Career Day Speaker

2011

Presented aviation career information specific to aerospace and flight test engineering to students at MTSU's elementary education laboratory school.

Experimental Aircraft Association Presentation

2008

Presented principles of aerodynamics to the Murfreesboro chapter of the Experimental Aircraft Association (EAA).

DA40 Flight Training Device Demonstrations

2006-2007

Provided a Department tour and flight training device (FTD) experience to high school students from a west Tennessee Upward Bound summer academic program. Upward Bound is a college preparatory program for students from low income families or from families with no college graduates. Provided the tour and FTD experience for Lebanon Special School District's EXTEND Gifted Program.

Rotary Club Presentation

2006

Presented information about MTSU's Aerospace Department, the Aerospace Technology concentration, and principles of fluid dynamics to Murfreesboro's Rotary club.

## **Publications**

Callender, M. (2023). Innovation in engine-out glide performance from sawtooth descent testing of a Beechcraft Bonanza. *The 54<sup>th</sup> Annual Symposium of the Society of Flight Test Engineers*. Accepted for publication on <https://www.sfte.org/2023paxriver.php> in October.

Callender, M. (2023). Pilot's guide to maximum glide performance: optimum bank angles in gliding turns. *Collegiate Aviation Review International*. 41(1), 180-208.

Callender, M. (2022). Sound pressure level measurements with standard and low noise propellers on a phantom 4 pro+. *Current Trends in Engineering Science*. 2 (2).

Callender, M. (2020). A möbius analogy to the Trinity. *Journal of the International Society of Christian Apologetics*. 13, 7-20.

Callender, M. (2018). Uas rotor sound pressure level reduction through leading edge, upper surface, and trailing edge modification. *Proceedings of AUVSI's XPonential 2018 Conference*.

Callender, M. (2017). Uas propeller/rotor sound pressure level reduction through leading edge modification. *Journal of Applied Mechanical Engineering*. 6:254. doi:10.4172/2168-9873.1000254.

Callender, M., Robinson, V. (2016). Small uas propeller/rotor sound pressure level and thrust testing: bioinspired modifications for uas noise reduction. *Proceedings of AUVSI's XPonential 2016 Conference*.

Callender, M. (2015). Rotating cylindrical bodies at low Re. *Proceedings of the 45th AIAA Fluid Dynamics Conference*.

Callender, M., Campbell, D. (2015). Design considerations for a martian unmanned aerial system. *Proceedings of the AUVSI Unmanned Systems 2015 Conference*.

Callender, M. (2014). The theoretical extension of Prandtl's inviscid lifting line theory to the viscous flow over rotating cylinders. *Journal of the Tennessee Academy of Science*. 89(1).

Callender, M., Dornan, W. A., Craig, P., Beckman, W., & Gossett, S. (2009). Transfer of skills from microsoft flight simulator x to an aircraft. *Proceedings of the International Symposium on Aviation Psychology, USA*, 221-226.

*Operational test director's quick reference target guide*. (2008). Murfreesboro, TN: Middle Tennessee State University.

Craig, P. A., Beckman, W. S., Callender, M., Gossett, S., & Dornan, W. (2008). Results from the first faa industry training standards (fits) commercial pilot training course – a student's perspective. *Proceedings of the International Symposium on Aviation Psychology, USA*, 402-407.

Callender, M. N. (2007). Transfer and cost effectiveness as guides to simulator/flight training device use. *Collegiate Aviation Review*. 26(1), 28-32.

Beckman, W. S., Callender, M. N., Gossett, S., Dornan, W. A., & Craig, P. A. (2007). Moving fits training from the laboratory to the flight line. Manuscript submitted for publication. *Collegiate Aviation Review*. 26(1), 21-27.

Pupalaiakis, R., Smith, C. F., & Callender, N. (2001). *Preliminary airworthiness evaluation of the ah-64d helicopter equipped with the digital electronic control (dec) 2000* (DTC Project No. 4-AI-100-LBA-063/KF). Fort Rucker, AL: U.S. Army Aviation Technical Test Center.

Ernst, C., Miller, W., Correia, J., Callender, N., Warren, J., Paris, S., Fell, W., & Chapman, A. (2001). *Nondevelopment item 2.75-Inch rocket motor airworthiness qualification test on the ah-64a helicopter* (DTC Project No. 4-MU-014-000-057/KF). Fort Rucker, AL: U.S. Army Aviation Technical Test Center.

## **Presentations**

The 54<sup>th</sup> Annual International Symposium of the Society of Flight Test Engineers. October 19<sup>th</sup>, 2023. Innovation in Engine-Out Glide Performance from Sawtooth Descent Testing of a Beechcraft Bonanza.

2023 UAA Collegiate Aviation Education Conference. September 28<sup>th</sup>, 2023. Pilot's Guide to Maximum Glide Performance: Optimum Bank Angles in Gliding Turns.

101st Airborne Division/EagleWerx and MTSU Aerospace Collaboration. October 26<sup>th</sup>, 2022. An Investigation and Optimization of Coaxial Rotors for UAS Noise and Thrust.

Jones College of Business Executive Education Series: Rethinking Church Leadership. October 13<sup>th</sup>, 2022. Components of Culture: 1) A Participating Population and 2) Intellectual Engagement.

10<sup>th</sup> International Conference on Mechanical & Aerospace Engineering. September 22<sup>nd</sup>, 2022. An Investigation and Optimization of Coaxial Rotors for UAS Noise Reduction

Annual Conference of the International Society of Christian Apologetics. March 25<sup>th</sup>, 2022. A Möbius Analogy to the Trinity.

Living Sent Ministries. April 14<sup>th</sup>, 2021. Platforms.

Open Arms Faculty and Staff Fellowship. October 23<sup>rd</sup> & November 13<sup>th</sup>, 2020. The Trinity.

9<sup>th</sup> International Conference on Mechanical & Aerospace Engineering. September 16<sup>th</sup>, 2021. Utilizing Automated and Randomized Quizzes and Exams in Undergraduate Aerodynamics: Lessons Learned from a Year of Remote Instruction.

LT&ITC Workshop. September 15<sup>th</sup>, 2021. D2L Quizzes: Tips for Increasing the Effectiveness of Numeric and Non-numeric Quizzes.

8<sup>th</sup> International Conference on Mechanical and Aerospace Engineering and Aerodynamics 2020 Webinar. September 17<sup>th</sup>, 2020. Autonomous Lecture Capture in Undergraduate Aerodynamics: System Description, Demonstration, and Benefits for Traditional and Remote Instruction.

Beginnings: International Christian Embassy Jerusalem's 2019 North America Conference. May 24<sup>th</sup>, 2019. Class Has Begun: Lessons from the Beginning about the Beginner.

MTSU Aerospace Department's Aerospace Innovative Research Seminar (AIRS). February 14<sup>th</sup>, 2019. Quieter Props and Tastier Hops.

MTSU College of Liberal Arts Lifelong Learning Program. May 7<sup>th</sup>, 14<sup>th</sup>, and 21<sup>st</sup>, 2018. Science and God.

AUVSI's XPonential 2018 Conference. May 2018. UAS Rotor Sound Pressure Level Reduction Through Leading Edge, Upper Surface, and Trailing Edge Modification.

Providence Christian School's (PCA) School of Rhetoric. April 2018. A Characteristic of God: A Mathematical Investigation of His Power.

City College Student Club Meeting. April 8<sup>th</sup>, 2018. Christian Worldview of Science.

The Orchard Student Club Meeting. November 14<sup>th</sup>, 2017. A Christian Worldview of Life in the Academy.

5<sup>th</sup> International Conference and Exhibition on Mechanical and Aerospace Engineering. October 2017. UAS Rotor Sound Pressure Level Reduction Through Leading Edge, Upper Surface, and Trailing Edge Modification.

MTSU LT&ITC Workshop. January 26<sup>th</sup>, 2017. There's a Robot in my Classroom!

MTSU LT&ITC Fall Faculty Fair. October 26<sup>th</sup>, 2016. The Swivl System for Lecture Capture.

MTSU College of Basic and Applied Sciences (CBAS) Teaching Exchange Panel. October 14<sup>th</sup>, 2016. The Swivl System for Lecture Capture.

Southern Illinois University Applied Sciences and Arts Multidisciplinary Research Symposium. October 2016. A Bioinspired Modification for UAS Propeller/Rotor Noise Reduction.

4<sup>th</sup> International Conference and Exhibition on Mechanical and Aerospace Engineering. October 2016. UAS Propeller/Rotor Sound Pressure Level Reduction Through Leading Edge Modification.

AUVSI's XPonential 2016 Conference. May 2016. Small UAS Propeller/Rotor Sound Pressure Level and Thrust Testing: Bioinspired Modifications for UAS Noise Reduction.

AUVSI's XPonential 2016 Conference. May 2016. A Student Robot Challenge using the Meccanoid G15KS Personal Robot.

Tennessee Board of Regents (TBR) Emerging Mobile Technologies and Immersive Virtual (VR) and Augmented Realities (AR) Faculty Forum

and Hands-On Exploration. February 11<sup>th</sup>, 2016. The Swivl System for Lecture Capture

3<sup>rd</sup> International Meeting and Exposition on Mechanical and Aerospace Engineering. October 2015. Theoretical Optimization of a Cylindrical Body of Rotation Using Magnus Effect Lift.

Open Arms Faculty and Staff Fellowship. September 24<sup>th</sup>, 2015. Mere Christianity.

45<sup>th</sup> AIAA Fluid Dynamics Conference. June 2015. Rotating Cylindrical Bodies at Low Re.

AUVSI Unmanned Systems 2015 Conference. May 2015. The Design Considerations for a Martian Unmanned Aerial System.

MTSU Research Exchange Luncheon of the College of Basic and Applied Sciences (CBAS). Spring 2015. Aerospace Technology Laboratory Research.

Open Arms Faculty and Staff Fellowship. Fall 2014. Love the Lord With All of Your Mind.

MTSU Research Exchange Luncheon of the College of Basic and Applied Sciences (CBAS). Spring 2014. Aerospace Technology Laboratory Research.

Campus Crusade for Christ Student Club Meeting. September 6<sup>th</sup>, 2013. My Science and My Faith.

2013 Meeting of the Tennessee Academy of Science. 2013. The Theoretical Extension of Prandtl's Inviscid Lifting Line Theory to the Viscous Flow over Rotating Cylinders.

Alpha Omega (AO) Student Club Meeting. October 5<sup>th</sup>, 2009. The 2<sup>nd</sup> Law of Thermodynamics and Its Implications.

2009 International Symposium on Aviation Psychology. 2009. Transfer of Skills from Microsoft Flight Simulator X to an Aircraft.

MTSU Scholars Week. 2009. Transfer of Skills from Microsoft Flight Simulator X to an Aircraft.

2008 University Aviation Association's (UAA) National Fall Conference. 2008. Transfer and Cost Effectiveness as Guides to Simulator/Flight Training Device Use.

Experimental Aircraft Association (EAA) Murfreesboro Chapter Meeting. July 10<sup>th</sup>, 2008. Aerodynamics.

University Aviation Association's (UAA) National Fall Conference. September 29<sup>th</sup>, 2006. The Introduction of Aerospace Students to Flight: A Five-Hour Flight Experience.

**Funded External  
Grants &  
Contracts**

Angle of Attack Indicator Incorporation in an MTSU Flight School DA-40, 2016  
\$1,000

Bonanza Performance Characterization Flight Test, 2015  
\$5,600

Design and Costing Study Services for a 5<sup>th</sup> Generation Aerial Target Contract, 2012  
\$80,763

Navy Quick Reference Guide for Targets Contracts  
Department of Defense, 2008  
\$55,629

Assessment and Implementation of Microsoft Flight Simulator X as a Component of Private Pilot Training in the General Aviation Population  
Air Safety Foundation, 2007  
\$169,010

**Expert Witness &  
Litigation**

Byron Cocke, et al., v. United States of America, et al. March 16<sup>th</sup>, 2022-Present. Power-off glide flight test design and engineering, aircraft glide performance calculations, aerodynamic drag calculations, and aerodynamics expert witness.

Stantec v. Nielson. 2010. Takeoff performance calculations.

**Certifications**

Private Pilot Single Engine Land, Tailwheel and High Performance Endorsements

Rotary Wing Stability and Control Flight Test Certificate

H2 USHPA Hand Glider Rating

Introduction to ANSYS Fluent Certificate