BRET P. VAN POPPEL, Ph.D.

Retired Brigadier General, U.S. Army

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CURRENT POSITION

Professor of Practice — Texas A&M University
Department of Aerospace Engineering — *August 2025 - present*

Professor Emeritus — U.S. Military Academy at West Point
Department of Civil & Mechanical Engineering — *August 2025 - present*

EDUCATION

University of Colorado — Boulder, CO
Ph.D. in Mechanical Engineering — *August 2007 - June 2010*

Massachusetts Institute of Technology — Cambridge, MA
S.M. in Aeronautics & Astronautics — *June 1999 - May 2001*

United States Military Academy — West Point, NY
B.S. in Mechanical Engineering — *June 1988 - May 1992*
Distinguished Cadet

ACADEMIC EXPERIENCE

Professor of Mechanical Engineering — Dept of Civil & Mechanical Engineering
U.S. Military Academy at West Point — *August 2020- 2025*

Associate Professor — Dept of Civil & Mechanical Engineering
U.S. Military Academy at West Point — *August 2014 - August 2020*

Assistant Professor — Dept of Civil & Mechanical Engineering
U.S. Military Academy at West Point — *May 2003 - May 2004*
December 2011 - August 2014

TEACHING and CURRICULUM DEVELOPMENT

COURSES TAUGHT, TEXAS A&M UNIVERSITY

- AERO201, *Introduction to Flight*, AY 26-1 (Texas A&M University)
- AERO307, *Aerospace Laboratory*, AY 26-1 (Texas A&M University)
- AERO681-600, *Communication*, AY 26-1, 24-2 (Texas A&M University)
- AERO681-601, *Professional Development*, AY 24-2 (Texas A&M University

COURSES TAUGHT, U.S. MILITARY ACADEMY at WEST POINT

- ME480, *Heat Transfer*, AY25-2, Course Director and Instructor, AY 19-1, 17-1, 03-1/2
- ME301, *Thermodynamics*, AY25-2, AY25-1
- MC362, *Fluid Mechanics*, AY 23-2
- MC300, *Introduction to Engineering Mechanics*, AY 23-1
- CE201, *Introduction to Civil Engineering*, AY 23-1, 22-1
- ME202, *Introduction to Data Analysis*, AY 22-2
- ME201, *Introduction to Mechanical Engineering*, AY 21-1, 22-1
- ME370, *Computer Aided Design*, AY 21-2, 15-1
- MC312, *Thermal-Fluid Systems II*, AY 19-2, 18-2, 18-1, 3-2, 14-2, 15-2, 16-2,
- MX400, *Officership*, AY 14-1, 14-2, 15-1, 15-2, 16-1, 16-2, 17-1, 17-2, 18-1
- MC306, *Dynamics*, AY 16-1
- MC311, *Thermal-Fluid Systems I*, AY 12-2, 13-1, and 14-1
- ME400, *Mechanical Engineering Seminar*, Crs Dir AY 14-2
- ME490, *Special Topics in Mechanical Engineering: Experimental Methods*, Crs Dir, AY 14-2
- ME350, *Introduction to Thermal Systems*, Course Director & Instructor, AY 13-1, 04-2
- ME389/489/A, *Independent Study in Mechanical Engineering*, Course Director AY 13-1
- EM301/A (AY 03-2), *Thermodynamics*, Course Director AY 04-1
- ME404, *Mechanical Engineering Design*, AY 02-04, AY 12 - present
- ME496, *Mechanical Engineering Capstone*, AY 02-04, AY 12 - present
- EM362/A, *Fluid Mechanics*, AY 02-1, 02-2
- MS302, *Ground Maneuver Warfare II*, AY 02-9 and AY 03-9 (intersession)

CURRICULUM DEVELOPMENT

- MC311, Thermal-Fluid Systems I. Conceptual architect for the two-course sequence integrating the classical subjects of Thermodynamics and Fluid Mechanics. Led a department team of faculty to build the first course in a two-course sequence.
- MC312, Thermal-Fluid Systems II. Co-chaired the faculty committee to develop the second course in a two-course sequence.
- ME201, Introduction to Mechanical Engineering. Served on the committee to build a new first-course in mechanical engineering introducing the engineering design process, solid modeling, and technical communication as part of a two-course sequence for sophomores. Developed all three lessons addressing Technical Communication (TECOM) for the new course.
- ME202, Introduction to Computational Analysis. Member of the department committee to develop and implement the second in a two-course sequence for mechanical engineers.

- TECOM Instruction. Developed all department instruction on technical communication for engineers and implemented across several courses in both civil and mechanical engineering. Personally delivered instruction to all students in all sections of ME201, CE201, MC312, and ME202 during AY22 and AY23. https://doi.org/10.1115/IMECE2024-142639

- Gas Turbine Laboratory. Developed and implemented a robust gas turbine laboratory experience for cadets majoring in mechanical engineering. The laboratory employs a real gas turbine engine which serves as the auxiliary power unit for the U.S. Army's UH-60 (Blackhawk) helicopter. Also developed and implemented a virtual version of the laboratory experience for export to other schools. Additional details available in this ASME paper: https://doi.org/10.1115/GT2019-91616

- Pipe Friction Laboratory. Working closely with department faculty and technical staff, refurbished a legacy laboratory test section and deployed it for use in multiple courses to support the civil and mechanical engineering curricula. The upgraded laboratory includes new instrumentation and supports qualitative and quantitative inquiry into hydrodynamics, fluid flow regimes, and uncertainty quantification using single-sample and multi-sample methods. Additional details available in this ASTFE paper, http://dx.doi.org/10.1615/TFEC2020.edu.031995.

- Heat Transfer Laboratories. Developed and implemented three robust laboratory experiences for the ME480, Heat Transfer course: Jet impingement heat transfer laboratory, http://dx.doi.org/10.1615/TFEC2019.edu.027644; Heat Exchanger Demonstration, //www.astfe.org/tfec2021/; and internal flow convecton heat transfer laboratory, http://dx.doi.org/10.1615/TFEC2019.edu.027539.

TEACHING AWARDS

- Dean's Award for Career Teaching Excellence, 2025
- Peter S. Michie Award, Outstanding Teacher (Senior Faculty Award), 2003
- Jared Mansfield Award, Outstanding Teacher (Junior Faculty Award), 2001

SCHOLARSHIP and RESEARCH

ACTIVE RESEARCH AREAS

- Basic and applied research in non-equilibrium hypersonic gaseous flows and their applications in hypersonic aerodynamics and propulsion. My work last year included modeling, simulation, and experimentation of hypersonic wall bounded laminar and turbulent viscous flows, high enthalpy non-equilibrium gases and plasmas; surface reactions, hypersonic wind tunnel design, advanced laser diagnostics, and flight tests.

- Advanced numerical methods for simulating electrohydrodynamic flows. The principal topic I explored during my dissertation research was the development of novel, numerically sharp methods for accurately simulating multiphase, electrically-charged Diesel-type sprays. In this work, surface effects at the phase interface as well as bulk dynamics are modeled in an accurate and robust manner. Furthermore, this work resulted in one of the few simulations of fully three-dimensional direct numerical simulations of electrically charged sprays.

- Engineering education research. My work in this area supports both scholarly efforts and teaching excellence. The areas I have addressed through the past 20 years include project-based learning, integrating curricula and the mechanical engineering program, and the development, implementation, or improvement laboratories. Of recent interest is technical communication (TECOM) for scientists and engineers.

SELECTED PUBLICATIONS

1. Christensen, B., Van Poppel, B., and Owkes, M. "A Computational Framework for Simulating and Analyzing Atomizing, Electrically Charged Diesel-type Jets." International Journal of Multiphase Flow, *Accepted 2 Aug 25*, https://www.sciencedirect.com/journal/

2. Lakin, Graham, Currin, Jacob, Garza, Santiaga, Van Poppel, Bret P., Morreale, Bryan, and Leyva, Ivett, "Experimental Investigation on Heat Streaks Behind a Swept, Second-Order Continuous Leading Edge in Hypersonic Flow" American Institute for Aeronautics and Astronautics (AIAA) Aviation Forum, July 2025.

3. Tamm, G. Arnas, A., Bellocchio, A. Benson, M., Fisk, B., Van Poppel, B. "Bringing Numerical Methods to Life in an Undergraduate Heat Transfer Course" American Society of Thermal and Fluids Engineers (ASTFE) 10th Thermal and Fluids Engineering Conference (TFEC), March 9-12, 2025, Partially Online Virtual and at George Washington University, DC, USA.

4. Groot, K., Smotzer, J. Morreale, B., Van Poppel, B.P., Leyva, I.A., "Unsteady Disturbance Amplification on a Wedge at Mach 6" American Institute for Aeronautics and Astronautics (AIAA) AIAA SCITECH 2025 Forum, January, 2025, https://doi.org/10.2514/6.2025-0306.

5. Lakin, Graham, Currin, Jacob, Garza, Santiaga, Van Poppel, Bret P., Morreale, Bryan, and Leyva, Ivett, 'An Experimental Investigation on the Origin of Heat Streaks for Swept Geometries in Hypersonic Flows" American Institute for Aeronautics and Astronautics (AIAA) AIAA SCITECH 2025 Forum, January, 2025, https://doi.org/10.2514/6.2025-1498.

6. Smotzer, Jacob, Morreale, Bryan J, Lakin, Graham, Van Poppel, Bret P., and Leyva, Ivett, "Numerical Study of the Origin of Heat Streaks on a Second-Order Continuous, Swept Geometry in Hypersonic Flow." American Institute for Aeronautics and Astronautics (AIAA) AIAA SCITECH 2025 Forum, January, 2025, https://doi.org/10.2514/6.2025-1499.

7. Ibañez, O.A., Siddiqui, F., Van Poppel, B.P., and Bowersox, R.D.W. "Experimental Measurements of Thermal Loading in Ogive Nose Cones on Cylinder-Flare Geometries in Hypervelocity Flow." American Institute for Aeronautics and Astronautics (AIAA) AIAA SCITECH 2025 Forum, January, 2025, https://doi.org/10.2514/6.2025-0488.

8. Van Poppel, B. P., Londner, E., Banko, A., Eils, C., Hoyer, B., Katalenich, S., and Zifchock, R. "Framework and Curricular Implementation of Technical Communication in an Undergraduate Mechanical Engineering Program." ASME 2024 International Mechanical Engineering Congress & Exposition IMECE2024 November 7–11, 2024, Portland, OR, USA. https://event.asme.org/IMECE.

9. Morreale, Bryan J, Smotzer, Jacob, Lakin, Graham, Van Poppel, Bret P., and Leyva, Ivett, "A Numerical Investigation on the Origin Mechanisms for Heat Streaks on Swept Geometries in Hypersonic Flows." American Institute for Aeronautics and Astronautics (AIAA) Aviation Forum, July 2024, https://doi.org/10.2514/6.2024-3837.

10. Owkes, M., Benson, M., Elkins, C., Wilde, N., Van Poppel, B. "Three-dimensional Velocity and Concentration Measurements and Simulations of a Scaled Jack Rabbit II Mock Urban Array" Atmospheric Environment, Volume 233, July 2020, 117520, https://doi.org/10.1016/j.atmosenv.2020.117520

11. Benson, M., Van Poppel, B., Elkins, C. and Owkes, M. "Three Dimensional Velocity And Temperature Field Measurements Of Internal And External Turbine Blade Features Using Magnetic Resonance Thermometry." Journal of Turbomachinery 135.3 (2019): 031018. https://doi.org/10.1115/1.4043151

12. Van Poppel, B., Desjardins, O., Daily, J.W. "A Ghost fluid, Level set Methodology for Simulating Electrohydrodynamic Atomization of Liquid Fuels." Journal of Computational Physics, 229 (20), 7977-7996. https://doi.org/10.1016/j.jcp.2010.07.003

13. Van Poppel, B., "Numerical Methods for Simulating Multiphase Electrohydrodynamic Flows with Application to Liquid Fuel Injection." Ph.D. Thesis, University of Colorado at Boulder, 2010. LINK

14. Van Poppel, B. "Tip Casing Heat Transfer Measurement of a Film-Cooled Turbine Stage in a Short Duration Facility." Master's Thesis, Massachusetts Institute of Technology, June, 2001. LINK

SERVICE and INSTITUTIONAL GOVERNANCE

PROFESSIONAL

- Reviewer, 16th Triennial International Conference on Liquid Atomization and Spray Systems (ICLASS), Shanghai China, June 2024.
- External reviewer (disinterested), Rochester Institute of Technology (RIT) College of Engineering. One candidate for promotion to full professor.
- Reviewer, American Society of Mechanical Engineers (ASME), Reviewer, Heat Transfer Division, AY16-present

INSTITUTIONAL & COMMUNITY

- (USMA) Co-Chair, West Point Technical Communication (TECOM) Initiative, August 2021 - present.
- (USMA) Chair, Academy Professor Search Committee, Department of Geography and Environmental Engineering, August - December 2023
- (USMA) Writing Across the Curriculum, Writing Program Writing Program, Executive Committee and Working Group AY16 - present

LEADERSHIP and FACULTY DEVELOPMENT

- **Professor, USMA and Department Head**
  Department of Civil and Mechanical Engineering, Academic Year 2022 - 202: Professor of Mechanical Engineering and Head of the Department of Civil and Mechanical Engineering at USMA. Recruit, select, and develop 36 military and civilian faculty and 13 staff members; conduct department-level strategic planning and strategic communications; oversee the development, implementation, and continuous improvement of two nationally ranked, fully accredited undergraduate engineering programs and their associated extracurricular enrichment activities; oversee department research and outreach programs through the Center for Innovation and Engineering (CIE); and manage the department's financial resources, facilities, and laboratories. Teach at least one course per academic term and advise at least one capstone project per academic year. Engage in scholarly activity, Academy governance, and service to professional organizations external to West Point. Serve as a positive role model for cadets, faculty, and staff in their development of leadership skills, moral and ethical values, and commitment as trusted Army professionals.

- **Professor, USMA and Deputy Head**
  Department of Civil and Mechanical Engineering, Academic Year 2018 - 2022: Recruit, select, and develop 36 military and civilian faculty and 13 staff members; conduct department-level strategic planning and strategic communications; supervise the development, implementation, and continuous improvement of two nationally ranked, fully accredited undergraduate engineering programs and their associated extracurricular enrichment activities; lead department research and outreach programs through the Center for Innovation and Engineering (CIE); and manage the department's financial resources, facilities, and laboratories.