

Hypersonic Viscous Aerothermochemistry: External Aerothermodynamics and Scramjet Fuel-Air Mixing

Thursday, March 28, 2024 • 3-4 p.m.
Hodson Hall 210 • Homewood Campus

PROGRAM

WELCOME

Andrew Douglas

*Executive Vice Dean and Emeritus Professor
Whiting School of Engineering*

INTRODUCTION OF SPEAKER

Kevin Hemker

*Alonzo G. Decker Chair and Professor of Mechanical Engineering
Whiting School of Engineering*

BILLIG-CROFT LECTURE

Hypersonic Viscous Aerothermochemistry:
External Aerothermodynamics and Scramjet Fuel-Air Mixing

Rodney Bowersox

*Deputy Director, Texas A&M Engineering Experiment Station
Associate Dean for Research, College of Engineering
Ford I Professor of Aerospace Engineering
Texas A&M University*

CLOSING

Andrew Douglas

Reception to follow in the lobby



JOHNS HOPKINS
WHITING SCHOOL
of ENGINEERING



SPEAKER

RODNEY BOWERSOX

Deputy Director, Texas A&M Engineering Experiment Station
Associate Dean for Research, College of Engineering
Ford I Professor of Aerospace Engineering
Texas A&M University

Rodney Bowersox is the senior associate dean for research in the college of engineering at Texas A&M University (TAMU), deputy director of TAMU's Engineering Experiment Station (TEES), holder of the Ford Motor Company design professorship, and a university regents and aerospace engineering professor. His research interests are focused on hypersonic flight and propulsion, including viscous flows, aerothermochemistry, non-equilibrium gases, jet interactions, diagnostics, and facility development. He founded and directs the TAMU National Aerothermochemistry and Hypersonic Flight Laboratory and is Principal Investigator and TEES Executive Director for the OUSD(R&E) JHTO University Consortium for Applied Hypersonics. Professor Bowersox is also a member of the Air Force Scientific Advisory Board, Fellow of the American Institute of Aeronautics and Astronautics and American Society of Mechanical Engineers. He earned bachelor's, master's, and doctoral degrees from Virginia Polytechnic Institute and State University.

Abstract: Current national interests in hypersonic flight provide motivation for accurate simulation of high-speed and propulsive flows, where combined viscous and high temperature gas effects are leading scientific challenges that limit system efficiencies and thermal management. The purpose of this presentation is to describe the elements of our approach, which is aimed at providing new physical understanding and mathematical treatments for high-speed viscous flows with non-equilibrium aerothermochemistry. First, an overview of research challenges associated with hypersonic viscous flow is provided. Second, mathematical treatments founded in physics-based transport are examined. Third, ground test, flight experiment, and simulation results are described that help reveal the roles of high-speeds and high-temperatures. The example flows are directly related to hypersonic external aerothermodynamics and scramjet propulsion. The test infrastructure at Texas A&M University will also be described, with a preview into future capabilities. Finally, the opportunities associated with the OUSD(R&E) JHTO University Consortium for Applied Hypersonics are discussed.

ABOUT L. GORDON CROFT

L. Gordon Croft, originally from Port Tobacco, MD, received his bachelor's degree in industrial engineering from Johns Hopkins in 1956 and his master's degree from George Washington University. After a successful career spanning 22 years with T. Rowe Price, Mr. Croft founded Croft-Leominster, Inc., a leading investment management firm, which he managed with his two sons.

Mr. Croft has a long history of dedication to Johns Hopkins University, including support for scholarships, faculty, and the Frederick S. Billig – L. Gordon Croft Endowed Lecture. The lecture brings experts in the fields of mechanical engineering, chemical and biomolecular engineering and entrepreneurship and management to campus in honor of his friend, Frederick S. Billig '55. In 2013, Croft Hall was named to honor Mr. Croft's legacy as a successful engineer, entrepreneur, financier, professor, and philanthropist. Mr. Croft is a recipient of the Johns Hopkins Distinguished Alumnus Award and a 2013 inductee to the Johns Hopkins Founder's Wall. He resides in Baltimore, and he and his late wife, Jane, have three children – Kent, Carol and Russell – and nine grandchildren.