



*Distinguished*  
**LECTURE SERIES**  
ONR 70<sup>TH</sup> ANNIVERSARY EDITION



# Breaking the Sound Barrier: The Intellectual Breakthroughs in Aerodynamics that Made It Possible

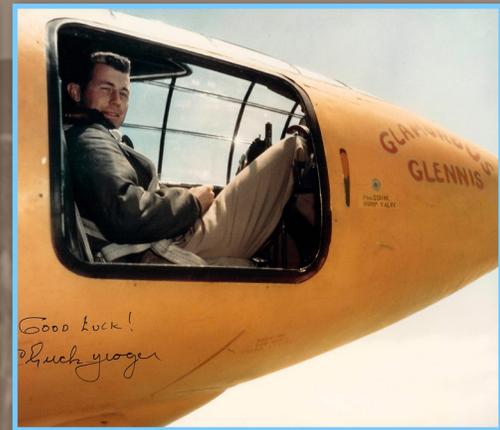
Presented by:

**Dr. John D. Anderson, Jr.**

Curator for Aerodynamics, National Air and Space Museum Smithsonian Institution,  
and Professor Emeritus, Aerospace Engineering, University of MD



**NOV. 7**  
**2016**  
**11 AM**  
IN THE JUNKER CENTER



Office of Naval Research  
875 N. Randolph St., Arlington, Virginia  
Bobby Junker Executive Conference Center, 14<sup>th</sup> Floor

Stream: <https://conference.apps.mil/webconf/onrdls>

# Breaking the Sound Barrier: The Intellectual Breakthroughs in Aerodynamics that Made It Possible

---

On October 14, 1947, the small but beautiful Bell X-1 became the first piloted airplane to fly faster than sound, with Captain Chuck Yeager at the controls. This flight was a breakthrough in the history of the airplane; Yeager and the X-1 had broken the “sound barrier”. But this flight was made possible by three centuries of breakthroughs in the intellectual understanding of high-speed aerodynamics. This presentation deals with these breakthroughs. We will see how our understanding of sound waves

and shock waves evolved, and how the mysteries of high-speed aerodynamics were slowly revealed, allowing people and flying machines to finally achieve what was considered by some to be impossible – flying faster than the speed of sound. The roles of science, engineering science, and engineering will be discussed. This presentation is for a general audience as well as for engineers and scientists. It tells one of the most exciting stories in the history of fluid dynamics and aerodynamics.

## ABOUT

### **Dr. John D. Anderson, Jr.**

---

Dr. John D. Anderson, Jr. graduated from the University of Florida with High Honors and a Bachelor of Aeronautical Engineering Degree in 1959, and from The Ohio State University with a Ph.D. in Aeronautical and Astronautical Engineering in 1966. He served as a Lieutenant and Task Scientist at Wright Field in Dayton (1959-1962), as Chief of the Hypersonics Group at the Naval Ordnance Laboratory in White Oak, Maryland (1966-1973), and became Chairman of the Department of Aerospace Engineering at the University of Maryland in 1973. After 1980 he served as Professor of Aerospace Engineering at Maryland, being designated a Distinguished Scholar/Teacher in 1982. In addition, in 1993 he was made a full faculty member of the Committee for the History and Philosophy of Science, and in 1996 an affiliate member of the History Department at the University of Maryland. In 1996 he became the Glenn L. Martin Distinguished Professor in Aerospace Engineering. He retired from the University in 1999, and was appointed Professor Emeritus. He is currently the Curator for Aerodynamics at the National

Air and Space Museum, Smithsonian Institution. Dr. Anderson has published eleven books, some in multiple editions, in the areas of aerodynamics, computational fluid dynamics, airplane performance, hypersonic aerodynamics, high-temperature gas dynamics, the history of aerodynamics, and the history of aeronautical engineering. These include *A History of Aerodynamics* (Cambridge University Press) and *The Airplane: A History of Its Technology* (American Institute of Aeronautics and Astronautics). McGraw-Hill has named his series of aerospace engineering textbooks the “Anderson Series” in recognition of their impact on engineering education. He is the author of over 120 papers in radiative gas dynamics, re-entry aerothermodynamics, gas dynamic and chemical lasers, computational fluid dynamics, applied aerodynamics, hypersonic flow, and the history of aeronautics. He is a member of the National Academy of Engineering, an Honorary Fellow of the American Institute of Aeronautics and Astronautics and a Fellow of the Royal Aeronautical Society.