Overview of Applied Aerosciences at NASA’s Lyndon B. Johnson Space Center

Abstract

NASA’s human spaceflight programs have been headquartered in Houston, TX, since the beginning of the Gemini program. During this time, design, development, and sustaining engineering for crewed flight systems have typically been led from NASA’s Lyndon B. Johnson Space Center’s Engineering Directorate. This talk will provide an overview of the research & project support activities performed in the Directorate in four disciplines: (i) aerodynamics, (ii) aerothermodynamics, (iii) rarefied gas dynamics, and (iv) parachute decelerator systems. Support activities from the final Space Shuttle missions, ongoing support of the International Space Station, development of the Multipurpose Crew Vehicle Orion, and recent partnerships formed with commercial companies that seek to restore a crewed U.S. launch capability to low-Earth-orbit will be presented, and near-term research opportunities will be discussed.

BIO

Mr. LeBeau is the Chief of the Applied Aeroscience and Computational Fluid Dynamics Branch at NASA’s Johnson Space Center (JSC) in Houston, Texas. This group provides JSC with discipline expertise in aerodynamics, aerothermodynamics, rarefied gas dynamics, and parachute systems, for ascent, entry, and orbital applications. His organization supports a current portfolio of programs that includes the International Space Station, the Orion Multi-Purpose Crew Vehicle, and NASA’s commercial cargo and crew initiatives via programmatic technical oversight and direct reimbursable work to partner companies. Mr. LeBeau received his B.S. and M.S. in Aerospace Engineering and Mechanics from the University of Minnesota in 1989 and 1990 respectively. Mr. LeBeau started at JSC as a cooperative education student in 1987, and was subsequently hired by the Applied Aeroscience and CFD Branch in 1991. His principal technical focus was the development and application of continuum and rarefied gas dynamic methods on high performance parallel computing systems. He is the primary author of the DSMC Analysis Code (DAC) package, which was honored with NASA’s Software of the Year Award in 2002. This software is used throughout NASA and industry to simulate low density flow applications, such as high altitude entry or aerobraking aerodynamics, aerothermodynamics, and on-orbit plume impingement.