Hypersonic and Re-Entry Flight Testing - X-15 to the Space Shuttle

ABSTRACT
The X-15 and Space Shuttle were unique hypersonic piloted vehicles that made aeronautics history. They flew through new flight regimes for winged vehicles, when the ability to predict aerodynamic characteristics was limited. Flight testing these vehicles presented challenges due to flight conditions, trajectories, and vehicle capabilities. Challenges were addressed by flight test engineers and the test pilots who flew them working together. It was important to accurately learn as much about the flight capabilities as possible for advancing technology and proving vehicle capabilities. New flight test techniques were developed on these programs to meet these needs. The X-15 testing plowed new ground in understanding hypersonic winged flight and unpowered descent and landing. In addition, X-15 test techniques informed the flight tests on the Space Shuttle. Testing during Shuttle entry cemented the understanding of its aerodynamics and flight control. It verified the Space Shuttle ability to perform the missions performed over its history.

Major General Joe Henry Engle and Doug Cooke will be discussing this history. Joe Engle was a key test pilot for both the X-15 and the Space Shuttle. Doug Cooke led the entry aerodynamic flight testing of the Space Shuttle during the Approach and Landing Tests in 1977 and early Space Shuttle flights. Joe and Doug worked together on the Space Shuttle testing throughout this period. It was an enjoyable and rewarding experience.

BIOGRAPHIES
Doug Cooke
Doug Cooke was lead for the Space Shuttle Entry Aerodynamic Flight Test Team 1976 to 1984. The flight testing was conducted during the Approach and Landing Tests in 1977 and during the early orbital flights from 1981 to 1984. Cooke is now an aerospace consultant with over 43 years in human space flight programs. He retired from NASA in 2011 after a 38-year career at Johnson Space Center and NASA Headquarters. During his NASA career, he had senior leadership responsibilities and achievements during critical periods of the Space Shuttle, International Space Station, and Human Exploration spaceflight programs. He was NASA technical advisor to the Columbia Accident Investigation Board in 2003.

Joe Henry Engle
Joe Henry Engle is an American fighter pilot and test pilot who served in the United States Air Force, testing the North American X-15 and Space Shuttle Enterprise, a former NASA astronaut, an aerospace engineer, and graduate of the University of Kansas. General Engle is the only person to have flown two winged vehicles into and from space and, as of 2016, is the only living X-15 pilot.