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AN UPDATE OF THE UPCOMING DLR REUSABILITY FLIGHT EXPERIMENT - REFEX

Abstract

During the last International Aeronautical Congress (IAC) in Adelaide the Reusability Flight Experiment (ReFEx), a technology demonstrator for Reusable Launch Vehicle (RLV) technologies was presented for the first time. ReFEx is being developed by DLR (German Aerospace Center) to provide flight and design data on, as well as operational experience with, a winged fly-back booster concept and is slated for launch in 2021. The experiment will be launched on a VSB-30 sounding rocket to altitudes and velocities similar to a first staging event and will then attempt a return flight along a trajectory comparable to a returning winged first stage RLV, transitioning from hypersonic speeds down to subsonic flight.

The key technologies demonstrated in this vehicle are, amongst others: aerodynamic design of a vehicle capable of stable flight through many flow regimes, guidance navigation and control (GNC) capable of on board generation of an optimized trajectory, the seamless transition between extra- and intra-atmospheric flight controls and health monitoring of the vehicle status during flight using advanced sensors such as FOS (Fiber Optic Sensors) and FADS (Flush Air Data System).

ReFEx is part of broad roadmap established between DLR and CNES paving the way toward larger sized RLV demonstrators in the mid-2020s timeframe. This roadmap explores many avenues of technologies necessary for a possible future European RLV. To this end joint system studies of such vehicles are ongoing in the context of the ReFEx project.

Since the last update ReFEx has successfully passed SRR (Systems Requirements Review) and entered phase B development. It was also approved as a fully funded project up to flight. This paper will give an overview of the current technological as well as the project status.