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FAA'S PROPOSED CONSEQUENCE PROTECTION CRITERIA FOR FLIGHT SAFETY SYSTEMS
AND FLIGHT ABORT FOR COMMERCIAL SPACE TRANSPORTATION

Abstract

The Federal Aviation Administration (FAA) regulates US commercial launch and reentry operations to the extent necessary “to ensure compliance with international obligations of the US and to protect public health and safety, safety of property, and national security and foreign policy interests of the United States” under 51 USC §50901. The FAA recently developed a comprehensive Notice of Proposed Rulemaking (NPRM) to streamline and consolidate its regulations that govern U.S. launch and reentry licensing. This paper will describe one of the most innovative and important elements of the NPRM: the use of consequence criteria to determine if a Flight Safety System (FSS) is necessary and when a flight abort must be implemented to protect public safety. The proposal would replace the one-size-fits-all approach in current regulations for Expendable Launch Vehicles (ELVs), which requires a highly reliable/tested FSS to prevent hazards from reaching protected areas during the flight of any guided launch vehicle. The proposal would also replace the process-based hazard control approach currently applied to Reusable Launch Vehicles (RLVs) in favor of a more quantitative and explicit criteria based on Conditional Expected Casualties (CEC). Unlike the current collective risk criterion applied to ELVs and RLVs based on Expected Casualties (EC), which factors in the probability that a dangerous event will occur, a CEC analysis reveals the expected outcome assuming the dangerous event will occur. This paper will explain the relationships between risks and consequences in general, and more specifics that distinguish the current EC and proposed CEC metrics. This paper will include an explanation of issues encountered with the current regulations, as well as the rationale for the proposed solution, including specific thresholds proposed to ensure that launch and reentry poses no more threat to the public than the over flight of conventional aircraft. This paper will explain how the FAA proposes to use CEC analyses to determine the need for flight abort with a reliable FSS as a hazard control strategy, to set reliability standards for any required FSS, and to determine when to initiate a flight abort whether the vehicle is reusable or expendable. The FAA estimated that the proposed approach would save the US commercial space transportation industry millions dollars over five years, while maintaining the high level of public safety achieved under the current regulations.