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AERODYNAMIC DESIGN OF A LIFTING RE-ENTRY VEHICLE FOR REAL GAS EFFECT FLIGHT  
TEST

**Abstract**

Real gas effect is one of the key technical challenges for reusable orbital vehicle development. Conducting flight demonstration is an effective way to understand the real gas flow characteristics. In this paper, investigation on the aerodynamic configurations of flight demonstrators, which are designed according to the requirements of flight tests for real gas effect studies, are conducted. The real gas effect is simulated by the numerical method with the equilibrium gas model. By analyzing the influence of real gas effect on the aerodynamic characteristics of different types of aerodynamic shapes, the aerodynamic design principles for real gas effect demonstrator are summarized. The aerodynamic configuration of a lifting re-entry vehicle that satisfies the requirements of real gas effect flight tests is proposed.