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A GENERAL FRAMEWORK FOR AERODYNAMIC THERMAL TEST OF LAUNCH VEHICLE  
FAIRING

**Abstract**

Ground tests to explore the aerodynamic thermal features of large structures in launch vehicle are considered as the efficient ways to facilitate the vehicle design as mere simulation could not yield sufficiently thorough and reliable results to verify whether the thermal design is reasonable. In this paper, a general framework guiding the conduction of ground thermal test for large structures such as launch vehicle's fairing is established, where the difficulties in carrying out such large-scale ground test and their corresponding solving methods are addressed in detail. Quartz lamps are utilized as the heating source due their quick response feature and relative low cost. Some key methodologies including the heater design, heat flux or temperature control over multi-zones, stress and strain measurements in extremely high temperature environment, efficient and stable power supply and safety control measures are discussed as well. In the end, a case study is reviewed where the whole implementation process is successfully completed for a fairing thermal ground test.