

Performance of supersonic parachutes behind slender bodies

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Abstract:

NASA's ASPIRE (Advanced Supersonic Parachute Inflation Research Experiments) project is investigating the supersonic deployment, inflation and aerodynamics of full-scale disk-gap-band (DGB) parachutes. The first two flight tests were carried out in October 2017 and March 2018, while a third test is planned for the fall of 2018. In these tests, Mars-relevant conditions are achieved by deploying the parachutes at high altitudes over Earth using a sounding rocket test platform. As a result, the parachute is deployed behind a slender body (roughly 1/6-th the diameter of the capsule that will use this parachute for descent at Mars). Because there is limited flight and experimental data for supersonic DGBs behind slender bodies, the development of the parachute aerodynamic models was informed by CFD simulations of both the leading body wake and the parachute canopy. This presentation will describe the development of the pre-flight parachute aerodynamic models and compare pre-flight predictions with the reconstructed performance of the parachute during the flight tests. Specific attention will be paid to the differences in parachute performance behind blunt and slender bodies.