

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures I - Development and Verification (Space Vehicles and Components) (1)

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INVESTIGATION OF AERODYNAMIC LOADING OF SPACE VEHICLES AT REENTRY
TRAJECTORY IN WIND TUNNELS AND ARC-HEATER FACILITIES

Abstract

During experimental development of launch vehicles for space systems, orbital and landing modules, descent vehicles the most part of tests is connected with measurements of aerogasdynamic loads. An example of such testing is investigation of gasdynamic loading of engine jets acted on orbital and lunar landing modules and their elements during docking/undocking at orbital path, landing and take-off from a planet surface using vacuum chambers. In presented report there are examined peculiarities of experimental study of the aerodynamic loads acted on space vehicles at reentry, retardation in planet atmosphere in wind tunnels and gasdynamic test units of TSNIIMASH facilities and several results of recent works directed to creation of new generation dynamometric instrumentation for measuring the static and dynamic forces and moments in order to support this study. General types of dynamometric instrumentation (strain-gauge balances and free-oscillation gears) dedicated for different tests are discussed; specifications and peculiarities of developed devices are presented. The examples of developed measuring devices for static and dynamic testing of vehicles intended for Mars exploration are given including tests in high temperature flow with free-oscillated model and its heat protection ablation.