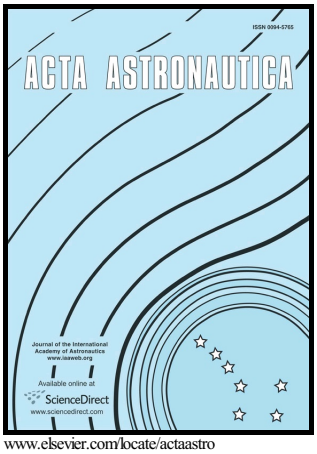

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Modeling of aerodynamic heat flux and thermoelastic behavior of nose caps of hypersonic vehicles

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Abstract

In this paper, the problem of numerical modeling of thermoelastic behavior of nose caps of hypersonic vehicles at different angles of attack is considered. 3D finite element modeling is performed by solving the coupled heat and elastic problems taking into account thermal and mechanical properties variations with temperature. A special method for calculating the aerodynamic heat flux entering the nose cap from its surface is proposed. This method is characterized by very low computational costs and allows calculating the aerodynamic heat flux at different values of the Mach number and angles of attack which may vary during the aerodynamic heating. The numerical results obtained by the proposed approach are compared with the numerical results and experimental data obtained by other authors. The developed approach has been used for