
Computational solution of conjugated problem of hypersonic air-dynamics and thermomechanics of thermodecomposition structures

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The coupled problem statement for aero-gas-dynamics, internal heat-mass-transfer and thermostrength of thermoprotective structures of hypersonic aircrafts has been formulated. The method for numerical solving the problem has been suggested, which is based on introducing two time scales: a slow time corresponding to a typical time of heat propagation in a coating structure of the aircraft and a fast time corresponding to a typical time of establishing the exterior aerodynamic flow. Examples of numerical solution of the coupled problem of aero-gas-dynamics and thermostrength of elements of thermoprotective structures of advanced aircrafts are given. It is shown that due to high temperatures of aerodynamic heating of structures made of polymer composite materials there can occur a thermodecomposition because of the polymer phase thermodecomposition and intensive internal gas generation in the structure materials.

Keywords: *air-gasdynamics, internal heat-mass-transfer, thermal-strength, hypersonic vehicle, heat-sheald, polymer composites, thermodecomposition, computational modeling.*

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