

MATERIALS AND STRUCTURES SYMPOSIUM (C2)  
Space Vehicles – Mechanical/Thermal/Fluidic Systems (7)

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NUMERICAL ANALYSIS OF INTEGRATED MODEL OF FLOW FIELD AND CARBON/CARBON  
STRUCTURE FOR TEMPERAYURE RESPONSE IN ARC TUNNEL

**Abstract**

Temperature realistic simulation of Carbon/Carbon hot structure under high velocity air has becoming more and more important in TPS refining design, in which integrated model of flow field and structure is the key to the question. In order to solve this problem, this paper showed that on the incoming flow conditions of high enthalpy air in arc tunnel, three dimensional chemical equilibrium Navier-Stokes equations are solved to analyse real gas effect in complete flow field around typical carbon/carbon structure. Thermal response of the carbon/carbon structure was solved. Air ionization, including seven chemical components and six chemical reactions were applied in the flow field simulation. Experimental incoming flow conditions and temperature response were used to correct the integrated model.