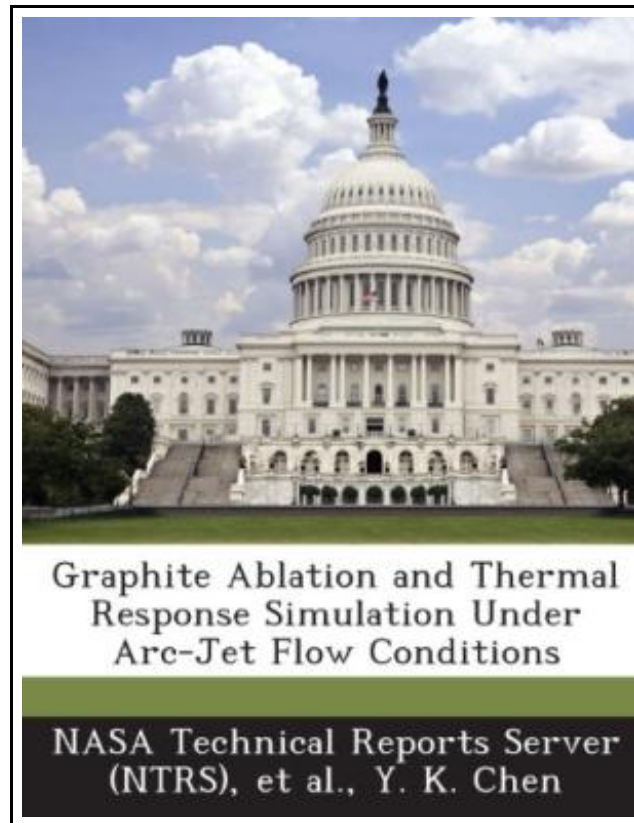


# Graphite Ablation and Thermal Response Simulation Under ARC-Jet Flow Conditions



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Bibliogov, United States, 2013. Paperback. Book Condition: New. 246 x 189 mm. Language: English . Brand New Book \*\*\*\*\* Print on Demand \*\*\*\*\*.The Two-dimensional Implicit Thermal Response and Ablation program, TITAN, was developed and integrated with a Navier-Stokes solver, GIANTS, for multidimensional ablation and shape change simulation of thermal protection systems in hypersonic flow environments. The governing equations in both codes are demoralized using the same finite-volume approximation with a general body-fitted coordinate system. Time-dependent solutions are achieved by an implicit time marching technique using Gauess-Siedel line relaxation with alternating sweeps. As the first part of a code validation study, this paper compares TITAN-GIANTS predictions with thermal response and recession data obtained from arc-jet tests recently conducted in the Interaction Heating Facility (IHF) at NASA Ames Research Center. The test models are graphite sphere-cones. Graphite was selected as a test material to minimize the uncertainties from material properties. Recession and thermal response data were obtained from two separate arc-jet test series. The first series was at a heat flux where graphite ablation is mainly due to sublimation, and the second series was at a relatively low heat flux where recession is the result of diffusion-controlled oxidation. Ablation and thermal response solutions for both sets of conditions, as calculated by TITAN-GIANTS, are presented and discussed in detail. Predicted shape change and temperature histories generally agree well with the data obtained from the arc-jet tests.



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