Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Data Reduction Modeling of a Graphite Nitridation Experiment[1]

PAUL BAUMAN, ROBERT MOSER, The University of Texas at Austin — In this work, we present a computational study of a flow tube experiment in order to infer reaction parameters for graphite nitridation. This study builds off previous work where it was determined existing, simplified models were inadequate to meaningfully inform parameters of the nitridation reaction of interest. We construct a two-dimensional representation of the experimental setup and model the flow using a reacting low-Mach number approximation to the Navier-Stokes equations. We use a stabilized finite element method to approximate the mathematical model. To solve the inverse problem for the reacting parameters, we employ a Bayesian approach in order to produce probability distributions that can used to quantify uncertainty in models where surface nitridation is important. Such models include the surface ablation of thermal protection systems of reentry vehicles.

[1]This material is based in part upon work supported by the Department of Energy [National Nuclear Security Administration] under Award Number [DE-FC52-08NA28615].

Robert Moser
The University of Texas at Austin

Date submitted: 03 Aug 2012 Electronic form version 1.4