A Model for the Oxidation of CSic Composite Structures

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Bibliogov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 24 pages. Dimensions: 9.7in. x 7.4in. x 0.1in.A mathematical theory and an accompanying numerical scheme have been developed for predicting the oxidation behavior of CSiC composite structures. The theory is derived from the mechanics of the flow of ideal gases through a porous solid. Within the mathematical formulation, two diffusion mechanisms are possible: (1) the relative diffusion of one species with respect to the mixture, which is concentration gradient driven and (2) the diffusion associated with the average velocity of the gas mixture, which is total gas pressure gradient driven. The result of the theoretical formulation is a set of two coupled nonlinear differential equations written in terms of the oxidant and oxide partial pressures. The differential equations must be solved simultaneously to obtain the partial vapor pressures of the oxidant and oxides as a function of space and time. The local rate of carbon oxidation is determined as a function of space and time using the map of the local oxidant partial vapor pressure along with the Arrhenius rate equation. The nonlinear differential equations are cast into matrix equations by applying the Bubnov-Galerkin weighted residual method, allowing...

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