Testing of design-theoretical model of silicon carbide aero thermo-chemical degradation washed by high-temperature air stream

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Silicon carbide is widely used in technologies to prevent high-energy devices construction elements from oxidation. The article presents the determination results of silicon carbide effective physical properties based on the inverse problem solution with respect to the experimental data for the material ablation obtained in the subsonic air jet plasma torch, and the design-theoretical model of this process, which have been published in the literature. The given model of silicon carbide mass ablation takes into account all the basic physical and chemical processes involved in the ablation of this material: heterogeneous chemical oxygen reaction with silicon carbide, that results in forming a silicon dioxide film on the material surface, the silicon dioxide sublimation on both film sides and gaseous components diffusion through this film, silicon dioxide ablation under the shear forces influence exerted by the gas stream. To calculate the heterogeneous chemical reaction, we use the Arrhenius equation, to calculate the silica carryover weight in the liquid phase, we use laminar boundary layer equations, and to calculate shear forces acting on the silicon dioxide film, we use Navier – Stokes equations. The article findings are designated to improve the silicon carbide thickness estimates quality required for protection of high-temperature products construction elements from oxidation.

Keywords: *carbon materials, silicon carbide, thermochemical destruction, destruction of silicon carbide, laminar boundary layer, layer against oxidation.*

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