

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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yakovenko.ivan@bk.ruNUMERICAL INVESTIGATION OF DETONATION SPRAY PROCESS OF SUSPENSIONS
CONTAINING NANO-PARTICLES**Abstract**

The study is devoted to the numerical analysis of the novel technology of suspension detonation spray of nano-particles for the deposition of functional coatings with inique properties on the substrate. By means of numerical analysis the dynamical processes accompanying the transfer of suspension droplets containing solid nano-particles in the gas flow behind the detonation wave in acetylene-based mixture are investigated. Full Navier-Stokes equation system for reactive gas mixture supplemented by the Lagrangian model of dropets dynamic with an account of interphase interaction, reduced chemical kinetics of acetylene oxidation and droplets heating and evaporation is employed for the numerical modeling. On the basis of the performed analysis of the various parameters such as the mixture composition, droplets compound and geometrical features of the substrate, detonation barrel and their relative position the ways for the optimization of detonation spray techology are proposed for the fields of deposition of aerospace coatings and additive manufacturing.