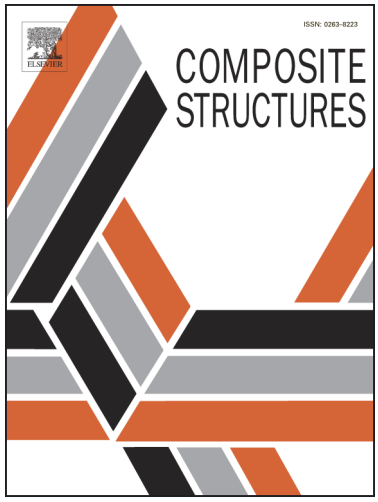

Unstructured Finite Element Modeling Thermally Sprayed Cermet Coatings Post-Treatment by Pulsed High-Energy Fluxes

O.P. Solonenko, A.A. Golovin

PII: S0263-8223(16)31827-X
DOI: http://dx.doi.org/10.1016/j.compstruct.2016.09.018
Reference: COST 7744

To appear in: *Composite Structures*

Received Date: 30 December 2015
Revised Date: 4 August 2016
Accepted Date: 12 September 2016

Please cite this article as: Solonenko, O.P., Golovin, A.A., Unstructured Finite Element Modeling Thermally Sprayed Cermet Coatings Post-Treatment by Pulsed High-Energy Fluxes, *Composite Structures* (2016), doi: http://dx.doi.org/10.1016/j.compstruct.2016.09.018

Unstructured Finite Element Modeling Thermally Sprayed Cermet Coatings Post-Treatment by Pulsed High-Energy Fluxes

O.P. Solonenko*, A.A. Golovin

Khristianovich Institute of Theoretical and Applied Mechanics, Siberian Branch of RAS,
4/1 Institutskaya str., Novosibirsk, 630090, Russia
*E-mail: solo@itam.nsc.ru, Tel.: +7-383-3301642, Fax: +7-383-3307268

Abstract

Thermal spraying of cermet coatings made of composite powders which particles consist of ultrafine carbide inclusions in metal or metal alloy matrix gives wide opportunities of creation of coatings for extreme application conditions. However, the high content of carbide inclusions in the cermet particles is the reason of their low level deformation at impact with substrate or coating surface that results in porosity of plasma as-sprayed layer. Decrease in coating porosity at simultaneous increase of its bond strength with substrate is possible by means of subsequent pulsed high-energy treatment. The problem consists in binder melting at minimum impact on carbide inclusions and substrate. Because the experimental development of this technology is rather multivariate procedure, a preliminary computer optimization is very perspective. The computing experiments were carried out, which allowed to optimize power density in a single pulse and its duration depending on thickness and porosity of the deposited TiC-NiCr layers.

Key words: cermet powder, binder, ultrafine carbide inclusions, splat, thermally sprayed coating, porosity, pulsed high-energy treatment, finite-element modeling.