

Generator for simulating the combined action of thermal shock and mechanical pressure pulse

Ostrik A.V.^{1,2,@} and Cheprunov A.A.³

¹ Federal Research Center of Problems of Chemical Physics and Medicinal Chemistry of the Russian Academy of Sciences, Academician Semenov Avenue 1, Chernogolovka, 142432,

² Leonov Moscow Region University of Technology, Gagarina Street 42, Korolev, 141070, None

³ 12 Central Scientific Research Institute of the Ministry of Defense of the Russian Federation, , Sergiev Posad, 141307, None

@ ostrik@ficp.ac.ru

The combined thermal and mechanical action of radiation and particle fluxes poses an increased hazard to the thin-walled structures of modern aircraft [1]. A new method for modeling the complex thermal and mechanical effect of radiation on structures is proposed. Thermal shock is created by surface heating during combustion of the pyrotechnic composition. A mechanical pressure pulse is generated by detonating the explosive.

The developed small-scale thermomechanical generator fundamentally expands the possibilities for making strength tests [2] on the action of radiation and particle fluxes. Pulse heating (up to 200°C) in combination with multiple (up to three pulses) mechanical pressure pulses (50 ... 500 Pa × s) are realized using the proposed device.

The generator is made in a mobile version and has passed experimental testing with various requirements for the reproduction of complex loading. Experimental studies have shown the need to take into account the effects of the joint thermal and mechanical effects of radiation on thin-walled structural elements.

- [1] Bakulin V and Ostrik A 2015 *Complex action of radiations and particles on the thin-walled constructions having heterogeneous coverings* (Moscow: Fizmatlit)
- [2] Ostrik A, Cheprunov A and et al 2008 *Mechanical X-ray action on thin walled composite constructions* (Moscow: FIZMATLIT)