

EXPERIMENTAL STUDY OF THE DISPERSION OF CONDENSED COMBUSTION PRODUCTS OF METALLIZED ENERGY-INTENSIVE MATERIALS UNDER MULTIDIRECTIONAL INERTIAL LOADS

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Abstract: The results of using an experimental technique that allows one to reproduce the impact of inertial forces (loads) of different magnitudes and directions on the dispersed composition of particles of condensed combustion products of energy-intensive materials (EM) are presented. Selection of condensed combustion products under the influence of loads was carried out in constant volume vessels mounted on a moving platform of a centrifugal stand allowing simulate loads of up to 30g. Mass integral functions of distribution of condensed phase particles by size at different operating overloads and in their absence were obtained and compared.

Keywords: condensed combustion products; energy-intensive materials; centrifuge; constant volume vessel; overloads

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Figure Captions

Figure 1 Experimental centrifuge scheme: 1 — sampling capsule; 2 — platform; 3 — drive shaft; 4 — electric motor and gearbox; and 5 — control and measuring systems

Figure 2 Sampling capsule scheme: 1 — frame; 2 — EM sample; 3 — ample mounting; 4 — boost and pressure gauge; 5 — ignition line sealed lead-in; and 6 — ignition with graphite filament

Figure 3 Directions of outflow of EM combustion products and the main forces acting on the particle: (a) for capsules Nos. 1–4; and (b) for capsules Nos. 5–8

Figure 4 Effective values of inertial loads

Figure 5 Mass-weighted particle size

Figure 6 Mass fraction of particles

Figure 7 The total mass of selected particles and the mass of accumulations of combustion product residues at the place where the sample is attached

Figure 8 Integral functions of particle size distribution for various acting loads: 1 — $n = 27.5$; 2 — 22; 3 — 16.6; 4 — 11.1; 5 — 13.1; 6 — 18.6; 7 — 24; 8 — 1; and 9 — $n = 1$

Figure 9 Residual mass of the condensed phase at the combustion site of the EM sample (a) and agglomerates and Al_2O_3 particles taken from the capsule (b)

Figure 10 Parts of agglomerates at the site of the burnt sample for capsules Nos. 5 (a), 6 (b), and 7 (c)

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