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A Model of a source of shock wave metal ejection based on the mechanism of the Richtmyer-Meshkov instability development ALLA GEORGIEVSKAYA, VICTOR RAEVSKY, Russian Federal Nuclear Center All Russian Research Institute of Experimental physics — Experimental and calculation studies show that the dominating factor defining characteristics of a shock wave ejection is a surface roughness. We developed the analytical model of the shock wave ejection by considering this process as the consequence of the Richtmyer-Meshkov instability development. The proposed model is based on the assumption that the surface roughness can be represented as periodic sinusoidal perturbations with an amplitude a_0 (a half of groove depth) and a wave length λ (distance from spike to spike between groove). Our model takes into account the effect of a shock break-out pressure, a shock wave profile, the initial amplitude and wave length of perturbations on space-time distribution of density, mass of particles ejected from material free surface, the link between velocities and sizes of particles, particle distribution by sizes. The model has been developed for metals transforming into liquid state after shock wave loading and releasing. We verified our model by comparing its results with the experimental data. It is shown that in liquid phase state of material the shock wave amplitude does not affect the ejected material mass, but is determined by the ratio $\beta = k^2 \cdot a_0 \cdot \Delta x$ ($k = 2\pi/\lambda$ is a wave number, Δx is a triangular shock wave pulse width). Besides, the ratio β determines a slope of the function of the particle distribution by sizes. The decrease in β at the constant shock break-out pressure leads to displacement of curves of size distributions in the direction of lesser sizes.

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