NUMERICAL SIMULATION OF THE INTERACTION OF HETEROGENEOUS DETONATION WITH THE POROUS INSERT OF DIFFERENT GEOMETRY*

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Abstract: Numerical simulation of interaction of heterogeneous detonation with a porous insert was carried out. The mathematical model for porous inserts assumed that the porous zone was a continuous medium in the form of a grid of stationary cylinders. Main regimes and critical conditions of detonation attenuation in porous zones were obtained for micron-sized aluminum particles. Main features of the flow field in the channel were described. It was found that for micron particles in the empty space, a planar detonation wave formed. Main patterns for micron-sized combustible particles and inert porous zone were found. The critical height of the empty space without porous inserts was determined. The critical height of the empty space did not depend on the amount of open areas in the porous zone. The critical height did not depend on the width of the channel. For micron-sized particles, a physical explanation for the existence of planar detonation based on the values of thermal relaxation times is proposed.

Keywords: physical and mathematical modeling; heterogeneous detonation; porous inserts; detonation failure

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