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Results of comparison between underwater explosions of Cu and Al wires and investigation of symmetry of a shock wave generated by a cylindrical wire array explosion

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Underwater electrical explosion of an Al wire can be accompanied by an exothermic process resulting in additional energy transferred to the generated water flow. Here, we report on recent results of a comparison between underwater electrical explosions of single Cu and Al wires. Experiments were carried out using a high-current pulse generator (70 kV, 40 kA, 100 ns). Using fast frame and streak intensified cameras, we compare the radial expansion of the exploding wires, the velocities of the generated shock waves, and the intensity of the light emission to make a conclusion regarding possible combustion of Al wires. We also compare these results to explosions of these wires in Glycerol in order to see whether it contributes to the generated shock waves'velocities.

In additions, we report on the results of preliminary experiments carried out to investigate the symmetry of a shock wave generated by an underwater explosion of a cylindrical wire array at radii <100 μm with respect to the axis of symmetry. The shock wave convergence symmetry is extremely important for generation of extreme states of matter in the vicinity of implosion, as well as for research of converging shock wave instabilities.

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