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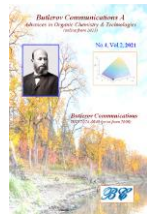

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Ballistic pendulum with forced braking

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Abstract

The modern development of weapons, military equipment, ammunition and, above all, their high-precision samples requires the study of the parameters of the near zone of the explosion. This is necessary both to increase the effectiveness of ammunition and to develop methods of protection against them. The need to obtain relevant knowledge has made the task of researching the parameters of the explosion of charges of explosives of explosives/ammunition with TNT equivalent of more than 10 kg and their registration in the near zone extremely urgent, when the distance from the center of the explosion to the measurement site does not exceed one dozen calibers.

For many decades, ballistic pendulums have been a reliable and most effective means of determining the performance of various high-energy condensed systems (gunpowder, explosives (explosives), solid propellants) and products based on them. The pendulums are used to determine the velocities of bodies, the total or specific impulses of the explosion, the energy of the explosion, as well as the brisance, both in the near and far zones. Therefore, this article discusses various designs of ballistic pendulums with forced braking, which can be used to determine the impulse of an explosion of a charge/products in the near zone, when the distance from the center of the explosion to the target does not exceed several calibers. Forced deceleration of the pendulum body is carried out through the use of various physical principles – elastic deformation of mechanical devices, the energy of the "counter" explosion, the reactive force of the cocurrent flow of the explosion products, the aerodynamic effect and the electromagnetic field. The proposed design schemes for the modernization of the ballistic pendulum will make it possible to test charges with an increased mass of explosives, and to measure, along with the total or specific impulse of the positive phase of compression of the shock wave of the explosion, also the contribution to the explosive loading of the accompanying damaging factors.

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References

[1] L.P. Orlenko. Explosion Physics. 3rd edition, revised, In 2 volumes. *Moscow: FIZMATLIT*. **2002** . Vol.1. 823p. (Russian)

[2] Mikhail A. Borovkov, Nikolay M. Vatutin, Victor S. Zavyalov, Vladimir V. Koltunov. Ballistic pendulum with forced braking. *Butlerov Communications*. **2021**. Vol.68. No.10. P.1-8. DOI: 10.37952/ROI-jbc-01/21-68-10-1 (Russian)