

## **Modeling the effect of acoustic Non-lethal Weapons**

*Fadeev G., Ermolaeva V., Nikolaev A.  
(Russia, MBSTU, department of chemistry)*

Our poster on 2-d European Symposium on Non-lethal Weapons was devoted to the study of the action of the acoustic fluctuation Non-lethal Weapons on four models that are steps to modeling of more complex biochemical systems of an organism. In the report for the 3<sup>d</sup> Symposium the further findings on the mechanism of acoustic weapons action on biochemical systems are presented. The results have been chosen that describe the influence of acoustic fluctuations on the modified biochemical polymeric systems, which in terms of physical and chemical characteristics are close to the substantial biological objects, biological membranes. The specific feature of these systems is an interaction of reagents that diffuse towards each other. In this case the approaches advanced in mathematical modeling of a chemical crystallization in porous media can be used for construction of a mathematical model.

Influence of the acoustic field on biological objects results from a combined action of the whole complex of factors: mechanical fluctuations of tissues, hydrodynamic impacts (producing physical and chemical effects), heat effects (caused by absorption of energy in tissues), etc. The role of each of specified and other factors in the total biological effect is hardly clear in many cases.

Local warming up of tissues seems to take place at low intensity and low frequency. At a certain threshold intensity of acoustic influences the secondary physical and chemical effects that result from strong overheat of tissues and appearance of any kind of cavitations (acoustic, hydrodynamical or impulsive) appear. The linear dependence is observed between the acoustic energy value and the destructive effect of a cavitation.

**Acoustic fluctuations, biological membranes, non-lethal weapons.**

## SPECIAL PYROTECHNIC NON-LETHAL MEANS

N. Varenykh, G. Bideev, A. Sporykhin (FSPC)

### ABSTRACT

The State Unitary Enterprise "Federal Research and Production Centre "Scientific Research Institute of Applied Chemistry" founded in 1945 is the leading pyrotechnic manufacturer in Russia.

Today the Institute is engaged in research, development and manufacture of pyrotechnic means in the field of arms, military equipment and special devices in more than ten directions, including antiterrorist ammunition, non-lethal means and self-defense weapon.

The report outlines new and advanced ammunition produced by the Institute for law-enforcement agencies and special services of the Russian Federation. They are:

— non-lethal flash-and-bang fire-arms. The complex "OSA" fitted with traumatic, flash-and-bang, signal and illuminating cartridges is distinguished by high efficiency at different distances of application (from 1 to 10 m) and minimal risk of inflicting heavy body damages. Besides, it is very difficult to adapt the complex for firing lethal munitions.

— a complete set of grenades for the GP-25 under-barrel grenade launcher, including the following types: a smoke grenade; a grenade for instant production of a smoke screen; flash-and-bang, illuminating and signal grenades. Grenades are equipped with a new generation fuze ensuring their programmed functioning in two ways: when the target is directly hit, and in a mode of predetermined operation at some distance, above the target according to the certain algorithm.

— a complete set of hand grenades: smoke, flash-and-smoke, flash-and bang with shock elements, flash-and-bang with multiple elements (cassette) and etc;

— a complete set of pyrotechnic means of a container type. The container represents a multielement system with 30-40 short barrels connected into a common compact structure. The operation of container munitions is performed according to the preorganized algorithm at a distance of up to 500 m.

— non-lethal security means of a modular type intended for warning and attack.

Key words: non-lethal weapon, antiterrorist ammunition, traumatic action, flash-and-bang, smoke, illuminating and signal grenades, pyrotechnic means of a container type.

Our address:

Federal Scientific and Production Centre  
Scientific Research Institute of Applied Chemistry  
3 Akademika Silina st.  
Sergiev Posad 141300  
Moscow Region  
Russian Federation