APPLICATION OF DETONATION CO2 LASERS FOR DEACTIVATION

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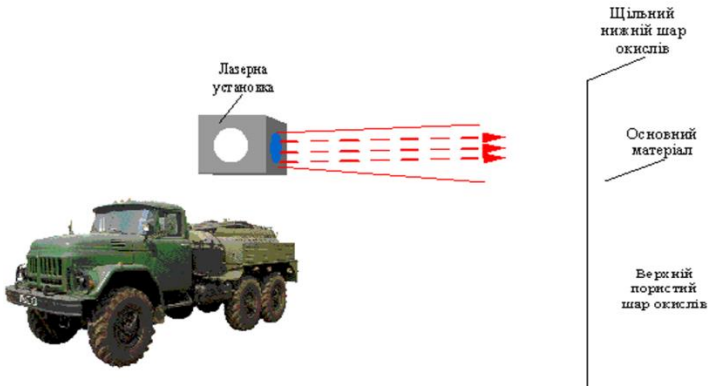
The radiation exposure from sources of ionizing radiation, widely used worldwide, is one of the dangerous anthropogenic factors that can have a negative impact on humans and the environment. The misuse of sources of ionizing radiation, in violation of norms, rules, and standards of radiation safety, poses a risk of external irradiation and can lead to contamination of the natural environment and the influx of radioactive substances into the human body, as evidenced by the Chernobyl Nuclear Power Plant accident in 1986 and the Fukushima Daiichi Nuclear Power Plant accident in 2011 (Japan).

During the Russian invasion of Ukraine on March 4, 2022, nuclear and thermal power plants were seized by Russian forces during the Battle of Enerhodar. On March 12, it was reported that the facility was under the control of the Russian company "Rosatom". The station continues to be operated by Ukrainian personnel under Russian control. The most probable scenario of a radiation catastrophe is considered to be an accident at the Zaporizhzhia Nuclear Power Plant involving the loss of power to the circulation pumps, leading to the cessation of cooling of the reactor's active zone.

It is worth reminding that Ukrainian intelligence has received information indicating that Russia is considering a scenario involving a terrorist act at the Zaporizhzhia Nuclear Power Plant with a release of radiation.

The key points of the article's material. Based on pulsating detonation systems, a proposed implementation of a detonation laser utilizes detonation combustion of fuel and the use of chemical reactions for energy pumping. Due to the absence of an additional working medium pumping system, the system's size and weight are reduced, and the overall efficiency is increased by eliminating energy costs for pumping the emitting working medium and raising the working temperature within the medium. The structure of the detonation laser is shown in Pic. 1.



Picture 1 – Detonation Laser Operation Scheme

References:

1. Галак О.В. Застосування детонаційних CO_2-лазерів для дезак-тивації Збірник наукових праць – Харків: ХУПС, 2014. – №1 (38). – С. – 241–245.