

**APPLICATION OF INACTIVE PAYLOAD TRANSFER BY VORTEX RING
IN NON-LETHAL WEAPON SYSTEMS**

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Vortex ring has been studied for a long time as an aerodynamic structure. Nowadays available information permits to make conclusion about the possibility of its application in non-lethal weapon (NLW) systems. Recently several investigations were carried out to reveal the opportunities and limitations of vortex rings application, and the feasible ways of target incapacitation by vortex ring. Three basic factors of the vortex rings action are distinguished: action by audible sound, impact (kinetic) action and action by inactive payload transferred by the vortex ring.

The analytical studies and preliminary estimations result in a conclusion that one of the most perspective feature of the use of vortex ring for NLW is the possibility of passive payload (irritants, algogens, marking mixtures) transfer with smallest lost during its propagation through the media.

This report presents the basic phenomenological approaches to the inactive payload transfer by the vortex ring as well as the engineering methods of determination of the most important parameters of payload transfer: mass lost, maximum critical payload mass, critical Reynolds number (if Reynolds number is more than critical one then the payload is not passive anymore). Furthermore the suggestions about the technical details of payload addition into the gas stream and the analysis of desirable agents (main irritants used for NLW) are discussed as well.

Key words: non-lethal weapon, turbulent flow, vortex ring, vortex gun, irritant.