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Preliminary Study on Water Filled Tank Perforation by Rod Projectiles XIN-KE XIAO, ZI-TAO GUO, ZHONG-CHENG MU, WEI ZHANG, Hypervelocity Impact Center, Harbin Institute of Technology — The effects of fluid structure interactions resulting from the impact of a fluid filled tank is of the interests for engineers from both the military and civilian field, where hydrodynamic-ram (HRAM) phenomena is well known. And it is believed HRAM is responsible for the vulnerability and the possible catastrophic failure of the whole tank. Thus HRAM is related to the majority concerns on this topic, where the targets were usually assumed to be thin. In order to investigate the influence of water on the crashworthiness of a tank with relatively thick walls, 3 ballistic shots on the water filled tank with two 3 mm 2A12 aluminum plates as front and back target and 4 shots on the tank without any water by 12.7 mm rods were conducted. The failure patterns were indentified from the tests and the difference in the failure mechanism was further studied by a series of detailed numerical simulations on the corresponding tests in hydro-code AUTODYN-2D by using both the coupled Lagrange-Euler technology and the SPH method. And also, the challenge of numerical simulation in this field is addressed.

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