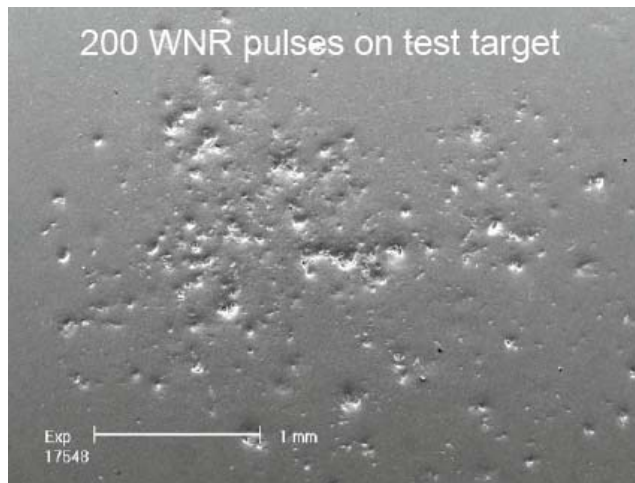


Cavitation Damage Mitigation of the SNS Target Vessel

Modeling & Simulation Group



Problem Statement:

When the intense proton beam hits the target vessel, a strong shock wave is generated, causing the formation of cavitation bubbles in the mercury. These bubbles collapse violently on the vessel wall causing erosion and shortening its service lifetime.

Technical Approach:

The approach would be to inject a cloud of very small bubbles that could absorb the initial pressure pulse, attenuate the pressure wave propagation, and suppress cavity growth.

Benefit:

Simulations can help to determine the optimum bubble population that must be introduced in the target vessel to efficiently mitigate cavitation damage.

Interaction Between an Underwater Explosion (UNDEX) and a Vessel Wake

Modeling & Simulation Group



Problem Statement:

The length and width of the bubbly wake behind the vessel depend mainly on its shape and the propeller speed. Such wakes can easily be detected and tracked by wake homing torpedoes because of the wake bubbles' large acoustic cross-section. A strong, shallow underwater explosion could disrupt the bubbly wake and confuse the torpedo.

Technical Approach:

The approach used was to calculate the interaction between the UNDEX and the bubbly wake in a 2D configuration using an Euler solver to compute the shock and fluid dynamics.

Benefit:

The efficiency of this method was investigated numerically. It shows that a large load is needed to disrupt the wake significantly.

