REDUCTION OF MUZZLE BLAST BY BARRIERS

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Noise-pollution around military training facilities caused by firing of explosives, artillery or large caliber guns poses a severe problem to neighbouring communities. One way to attenuate the blast in the far field is the construction of blast walls close to the explosion center. At TNO Prins Maurits Laboratory an extensive research has been conducted aimed at studying the effectiveness of blast walls in reducing the noise from large caliber firings.

The research program was comprised of:
- An experimental study at laboratory scale (1:125) using a blast simulator. Two-dimensional models of a screen and a dike were placed in a 40x40 cm2 blast simulator and loaded with plane shocks with peak pressures varying between 6.5 and 37 kPa. The pressure field around the barrier was measured with pressure transducers and the flow was visualized by means of interferometric techniques.

- An extensive series of measurements on a 1:10 scale model of an howitzer test site. A detonator was used to generate the scaled blast. The effect of two types of barriers, i.e. a screen and a dike with a small top-screen, was investigated. At several locations around the detonator, in front of the screen as well as behind, blast overpressures were measured by means of pressure probes.

- Blast measurements were performed at the actual howitzer test site. At several locations in front and behind a 5m high dike-shaped barrier blast measurements were performed during the firing of a 155 mm caliber Howitzer for two types of propellant charges, 7M4 and 3M4.

In the paper a comparison between the full scale and the scale model tests will be made, allowing the verification of blast scaling laws. From both measurement series it can be concluded that the area of substantial noise-reduction (>5 dB) is limited, and is confined to a region of a few barrier heights behind the barrier. It will be shown that calculations based on the linear acoustic theory tend to overestimate the blast reduction by barriers.