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Abstract:
Transportation of Dangerous Goods (DG) represents an important portion of the overall transport of freight in the world. Ground transport (excluding pipelines) moves approximately 21 to 31% of the total tonnage of DG in Canada. Accidents involving DG might occur at any time, at any location along transport routes or within storage areas. Such accidents not only affect people and the environment but also have a great impact on the economy. To minimize the effects of transportation accidents associated with DG, the use of suppressive shield technology has been recommended by several researchers.

This thesis presents the details of experimental and numerical investigations studying the performance of suppressive shield panels (SSPs) for civilian applications. The SSPs were built using commercially-available steel angles in various configurations and were tested to determine their blast mitigation capability against blast pressure from the detonation of three explosive masses of Pentolite, 0.25, 0.50 and 1.00 kg. The SSP technology can be used for the storage, processing and transport of explosive materials, and can also be applied to protecting attractive targets and infrastructure that are deemed vulnerable to explosive attacks, including those attacks accompanied by the threat of fragment bombs.

The results obtained from the numerical investigation correlated well with those from the experimental tests on the SSPs, where the attenuation was found to range from 40 to 60%. The accuracy in predicting the pressure attenuation demonstrates the capability of numerical modeling as an efficient tool in the study of SSPs applications in various scenarios and can be used to predict the performance of the SSPs when subjected to blast loads from larger explosive charges without the need to carry out expensive and complex field tests.

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