SIMULATIONS OF BLAST WAVES IN AN URBAN ENVIRONMENT

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Explosions in urban environments can cause damage to buildings such as window failures and more severe structural damage such as partial or total collapse. Although conventional buildings are usually not designed to withstand large blast loads, it is possible to improve the performance of such structures. Apart from a proper structural design, it is also important to accurately predict the blast loads on the structural components. Using a numerical tool helps predicting the structural loads from an explosion at a distance taking into account surrounding buildings, walls and other objects in the environment. Apollo Blastsimulator is a CFD (Computational Fluid Dynamics) code developed by Fraunhofer EMI for simulations of explosions and blast waves. Local and global mesh adaption is employed in Apollo to enable simulations with high accuracy at limited CPU times.

The work in the future paper will present the shielding effects of walls or buildings in front of other structures in an urban environment. The purpose of the work is to perform analyses of how different parameters such as charge size, charge location, wall dimensions, distance to the building behind the wall etc. affect the loads on the building. The accuracy of the analyses, with the use of Apollo, will be based on simulations of previous experiments of explosions in an urban environment [1]. A series of simulations of the experiments have shown that the blast loads on the different buildings have been captured with good accuracy. The paper will include comparisons with the experiments but will mainly focus on the simulations of the shielding effects.

[1] Johansson, M., Laine, L., *Resistance capacities of buildings for extreme dynamic loading, Report 2: Explosions at an intersection*, Swedish Civil Contingencies Agency (MSB), Karlstad, 2008 (in Swedish).