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BLAST VULNERABILITY OF MILITARY FIELD STRUCTURES AND PERSONNEL

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Blast loading of protective structures and consequent blast ingress and personal vulnerability (PV) is of increasing priority due to the expanding role of the military in MOUT/FIBUA operations and the growing threat of blast weapons, including terrorist-style bombing attacks targeting both military and civilian personnel. A multi-faceted program for blast-threat assessment of military field fortifications has been undertaken at DRDC-Suffield including:

- Conduct of full-scale blast field-trials against typical military field fortifications to establish a measurements database for blast diffraction loading of the structures, structural damage, blast ingress, including assessment of personnel vulnerability and incapacitation;
- Validation of CFD codes in the capacity to model blast sources such as TBX and FAE and consequent blast diffraction loading over and into structures and validation of CSM codes/fast-running models to model structural response;
- Assessment of experimental issues from currently available diagnostics for personal vulnerability to blast and their related algorithms for injury assessment;
- Development of a CFD-based capability specifically to resolve personal vulnerability to blast by directly incorporating the algorithms for injury assessment with the intention to plot "PV maps" for a given target geometry comparable to gas-dynamic flow variables.

Progress is described with respect to the first set of three field-trial operations evaluating blast effects against bunkers and fortified observation positions, some of which included PV diagnostics. Experimental results for external and internal blast loading for the case of an FAE attack are compared to CFD modeling and good agreement is shown. In addition to direct blast effects, high-speed imagery shows that dust lofting may be a significant problem with regard to obscuration, eye-damage, and breathing within field fortifications. Simple countermeasure designs are proposed.