P15 Development of a Blast Severity Comparative Tool

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Abstract:

Soldiers and law enforcement officers involved in Explosive Ordnance Disposal or explosive breaching often face the need to assess, or quantify, the threat posed to them by an explosive charge. An assessment of the threat involves the quantification of the blast severity related to the explosive charge, as well as the potential injury posed to the individual. Existing blast injury criteria have not been fully validated, especially when individuals wear blast protection. Moreover, some of these injury criteria require the use of specialized test devices to arrive at injury predictions. In other cases, injury predictions are solely based on explosive characteristics (e.g. Bowen charts), but they are not convenient for users to apply in the field, or may require specialized calculation tools. The objective of this paper is to provide a simple and user-friendly graphical tool aimed at comparing the blast severity of different explosive charge configurations, by plotting constant scaled distance (pressure) and constant impulse curves. This tool only requires the explosive mass and standoff distance as an input, as opposed to other engineering blast parameters, not well known to end users. Not being based on injury criteria, this tool does not depend on all of their underlying assumptions, and does not require data from specialized test rigs. It is demonstrated that the relative severity of any two blast conditions can be ascertained through this simple methodology, where one of the conditions serves as the reference, or known, condition. Constant injury curves from existing models provided validation of that graphical tool. Although relying solely on simple blast physics equations and concepts, this tool provides significant insight into knowledge of blast physics, and raises important validity conditions for injury criteria. This tool can also be used in areas other than personal protection to compare the severity of blast conditions (e.g. infrastructure protection).

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