AN ADVANCED BLAST SIMULATOR

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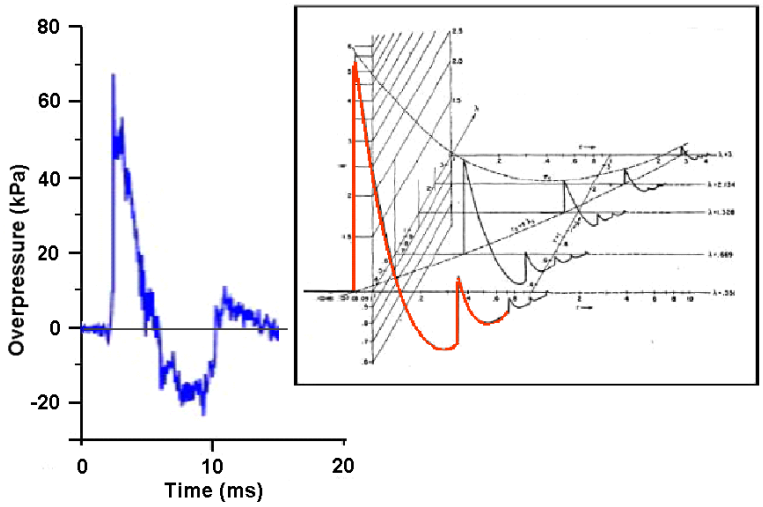
The MABS forum was founded over 45yrs ago with the task to develop blast simulators to replicate nuclear blast-wave conditions for Defence research experiments. Although that mandate has evolved and broadened to encompass practically all military aspects of explosive blast research including computational modeling, the challenge remains to develop high-quality and efficient simulation methods for experimental studies now extended to assess threats such as IEDs (Improvised Explosive Devices). Following on from a paper at MABS21, an advanced blast simulator design based on a simple but specially designed shock tube is described which inherently replicates true blast-wave profiles including a negative phase and secondary shock. This design is novel and supercedes earlier variants such as that based on conically divergent geometry. The Advanced Blast Simulator (ABS) also incorporates an end-wave-eliminator which combines reflected-wave elimination to ensure simulation of a single-pulse event and an anechoic dump tank to mitigate noise and gas efflux into the external facility space. The ABS design is capable of tailoring waveforms, and for illustration the classical blast waveform as predicted by Brode[1] was reproduced experimentally as shown in the Figure below.



Comparison of blast waveforms as generated by a prototype Advanced Blast Simulator (blue) with the classical solution from Brode (red).

[1] Brode, H.L., "Blast Wave from a Spherical Charge", *Phys.Fluids*, Vol.2, No.2, 1959.