SECONDARY AND HIGHT OF BURST SHOCK REFLECTIONS: APPLICATION OF AFTERBURNING

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The LS-DYNA model for afterburning was calibrated by Schwer & Rigby (2017) for reflected pressure measurements of open air hemispherical surface bursts reported by Tyas et al. (2016).

The inclusion of afterburning in a reflected air blast pressure simulation was shown to affect the secondary shock arrival time and magnitude. There is not sufficient information available from such measured pressure histories to uniquely calibrate the afterburn model parameters. The afterburn model is based on the Jones-Wilkins-Lee (JWL) equation of state with an additional four parameters:

1. Start time for afterburning energy
2. End time for afterburning energy
3. Amount of afterburning energy to be added
4. Rate at which the energy is added, i.e. either linearly increasing or constant.

While hemispherical surface bursts are of interest for structural analysis, perhaps a more common scenario is structural response to height of burst (HOB) charges. The LS-DYNA afterburn model was applied to two such sets of experimental results:

1. Three repeat tests with multiple diagnostics reported by Anderson et al. (2016)
2. An extensive set of repeat field tests summarized by Netherton and Stewart (2013).

In addition to recording incident and secondary shocks, these measurements included reflected shocks from the ground surface. These latter measurements provide an opportunity to evaluate the LS-DYNA afterburn model for late time response beyond the secondary shock. It is observed that although the afterburn model can be calibrated to the secondary shock it has essentially no effect on the reflected shock from the ground. The reason for the lack of agreement between data and simulation for the reflected shock is speculated.

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