NON-IDEAL AIRBLAST PREDICTION WITHOUT ALGORITHMS: A NEURAL NET APPROACH

FRANKEL,M.J.; RESSLEY,R.

Predicting non-ideal airblast (NIAB) is, presently, a complex and invalidated computational art. The complexity of the contributing phenomenologies and the resulting approximations associated with the realistic models of radiative absorption by real soils, a dust loading component to dynamic pressures, possible contributions from ground heave and so on, guarantee that models of thermal precursor formation and effects will remain a daunting and highly uncertain first principles calculational feat.

Simple engineering algorithms such as those embodied in the soon to be published EM-1 NIAB chapter update may avoid most of these issues by relying on experimental data to tune entirely empirical or semi-empirical predictive models for the phenomenology of interest, but still require the development or specification of algorithmic rules describing the dependence of the response parameters on the relevant input variables.

In this paper we present an entirely new approach to predicting NIAB response parameters of interest. This approach has the significant advantage of not requiring model formulation at all, relying instead on powerful artificial intelligence techniques to detect patterns in presented experimental data and effectively infer relationships between input parameters, such as height of burst, yield, etc. and the desired nuclear environment output response. The utility of this approach will be demonstrated by its application to the problem of predicting NIAB induced pressure fields. Other Potential applications, advantages, and Potential constraints will also be discussed.