RAPID ASSESSMENT OF STRUCTURES SUBJECTED TO LOCALISED BLAST

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The design of modern military and naval platforms is often assisted by experiments and computational simulations, which provide relevant insights about material reliability, mechanical performance and design vulnerability. Despite recent technological advancements that have allowed for more reliable and affordable sensors and equipment for gathering data from experimental tests and for massive parallel computations, the long lead times needed for setting up experiments or for processing high strain rate simulations may restrict, or even prohibit, their applicability. A new tool based on Artificial Neural Networks (ANN) that can detect patterns in experimental and numerical data is proposed for giving timely conclusions about overall structural response. Using a supervised training regimen the authors combined experimental results and blast simulations to ascertain the capability of the ANN to predict physical response to blast events. Responses such as bulging, impulse and failure modes are computed based on readily available inputs such as yield stress, charge properties and the plate dimensions.