A DECOUPLED STUDY OF THE DISPLACEMENT OF AN M113 SUBJECTED TO NON-IDEAL AIR-BLAST (NIAB) LOADS

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The displacement of a ground vehicle subjected to non-ideal air-blast (NIAB) loads can often be used to infer damage to the internal components of the vehicle. In an earlier effort [Reference l, Paper No. LBO1, MABS15, 1997], the ability of the Large Blast and Thermal Simulator (LB/TS) to produce realistic NIAB waveforms at the test section of the tunnel was demonstrated. The result of the earlier effort suggests that the relationship between NIAB loads and vehicle displacement can be obtained via a decoupled approach. This approach divides the study of blast/vehicle/ground interactions into two phases. Phase I is the blast/vehicle interaction phase where the effect of the ground surface is minimal. Phase II is the vehicle/ground interaction phase where the effect of the blast on the vehicle is small. A US Army Armored Personnel Carrier, the M113, was chosen for these experiments. The vehicle displacement in Part 1 was studied by in-tunnel experiments in the LB/TS similar to the NIAB4 test in [1]. The take-off and the beginning of the flight of the vehicle were captured by in-tunnel video cameras. The horizontal acceleration, along the axis of the tunnel, experienced by the vehicle was recorded in an onboard data recording system. The vehicle was first accelerated to the desired speed as determined from Part I. Then it was dropped onto the desert surface. A video camera recorded the drop and the subsequent vehicle/ground interaction. The total displacement was determined by adding the displacement calculated from each phase. Four tests were performed. Comparing with the existing jeep data, it is concluded that the trend of the M 113 data is similar to the jeep data.