A NEW APPROACH TO THE SIMULATION OF NUCLEAR BLAST EFFECTS ON VEHICLES IN A TUNNEL SIMULATOR

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The total blast loading on any given face of a vehicle is equal to the sum of the overpressure and the drag pressure. Both the shock reflection factor and the drag coefficient have values dependent upon the orientation of the particular face to the blast front. For a particular point on a surface, the loading depends also on the distance from the point to the various edges. There are, in actual fact, several cycles of reflected and rarefaction waves traveling across the surfaces before damping out. These fluctuations are considered to be of minor significance, as far as the loading under free-field conditions is concerned.
Pressure-time histories of nuclear explosions can be simulated in underground tunnels in a method similar to shock tubes, Suited tunnels are available in several countries. However, some vehicles of military interest are so big, that a considerable fraction of the tunnel cross section is barricaded if a vehicle is brought into the tunnel. As a consequence the shock front configuration is affected during the diffraction phase of loading. Most attention will be paid to the change of the flow characteristics during the drag phase of loading. Fluctuations may become more significant, as far as damage to components of the vehicle is concerned.
Results of small scale testing will be reported, that were conducted in order to find out to what extent free field loading can be simulated under those conditions.