A METHOD FOR MEASURING INITIAL MOTIONS FROM THE ACCELERATION-TIME RECORDS OF SHELTERS EXPOSED ON A HIGH-EXPLOSIVE EVENT

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It has proved very difficult to carry out direct active and direct passive measurements of the initial wall, floor and roof deflections of shelters caused by a simulated nuclear airblast environment. Active measurements of these deflections for shelters by rectilinear potentiometers and springtightened strings have been hampered by problems caused by misalignment of the sensor, movement or dislodgment of the sensor base, and inability of the sensor to respond quickly. During passive measurements with sliding rods and breakaway sticks, there were problems with framework dislodgment and with situations where the deflections were larger than anticipated.

This report describes an indirect method for obtaining early-time displacements and deflections with respect to the shelter center of interior volume. The deflections were obtained by taking the difference between appropriate displacements on the walls, ceiling, and floor of the shelter. This indirect method for measuring deflections compares well with results obtained by other methods for the early-time initial shelter motions. While efforts to improve the direct measurement of deflection should continue, it is recommended that future shelter tests be instrumented to facilitate this indirect measurement technique.