

WALL COLLAPSE HISTORY IN BLAST WAVES

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When the walls of a building are acted upon by a force such as that of airblast, the wall develops internal resistance to horizontal deflection that depends on the type of construction, material properties and edge restraint. And this resistance varies with the magnitude of the deflection itself. Our analytic method establishes a resistance function for each wall of interest by considering the wall's primary response mode, that is, the dominant way in which the wall reacts to a uniformly distributed horizontal force. The wall is then transformed into an equivalent single-degree-of- freedom dynamic system by the use of transformation factors for its load, resistance and mass (combined into a single "load-mass" factor), and an equation of motion is solved by numerical integration with a computer.

For unreinforced load-bearing walls resistance functions are based on two independent idealized behaviors, neither of which may accurately reflect all aspects of actual events but which are sufficiently different to embrace a range of behavior. In this work wall motion has been observed during high explosive tests by means of electronic gages attached at the center of front, side and rear walls of two buildings. Since the single-degree-of-freedom models used in estimating wall response are designed to provide central wall motion, gage readings may be compared directly with calculations. Pressure gages recorded air pressure histories inside and outside test buildings and accelerometers observed motion at the top and bottom of front walls.