

P82 Estimation of Global Structure Influence on Component Response to Blast Loads and Implications for the Prediction of Disproportionate Collapse

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Abstract:

Component damage resulting in the disproportionate collapse of a structure is generally calculated by consideration of a component specimen, to which the appropriate boundary conditions are applied. Similarly, tests that are intended to provide data pertaining to global response will typically utilize representative components or small subassemblies. The key to the feasibility and efficacy of such tests is ensuring that the influences on these specimens from the rest of the structural system are properly captured.

In this paper, the influence on the response of a component from the surrounding structural system by assigning appropriate boundary conditions to the local model is proposed as a means to design a structurally representative test specimen. Furthermore, the study will demonstrate how the application of appropriate boundary conditions to a test specimen can successfully capture the anticipated global response behaviors.

The number of variables required to characterize the boundary conditions for a structural component is dependent upon the number of physical quantities needed to represent the influences of the surrounding global system. Mass and stiffness effects would be typical of the physical effects to be approximated by the test specimen boundary conditions. It will also be shown that the effect of damping can be regarded as negligible.

In this study, stiffness and mass at the boundaries representing every disconnected location were considered as variables to be approximated by the boundary condition of the components.

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