Darren W. Tennant, Howard S. Levine, and Darell Lawver Weidlinger Associates

Use of a First Principle Finite Element Code to Analyze the Response of Large Structures and Component Models Subjected to Blast Environments

The ability to predict the response of a large conventional structure subjected to a terrorist blast is of great importance in assessing the vulnerability of these buildings to local damage and global (progressive) collapse. In order to accurately predict the response of the structure through failure a detailed, three dimensional representation of the various structural components is needed. Advanced constitutive models for steel and concrete are needed to accurately represent the response through failure and localization. Validation of the finite element tools versus test is also important. Conducting large-scale simulations of multi story buildings is a complicated and time intensive endeavor. Effective use of component models reduces the time and complexity of the modeling efforts. In this paper a comparison of pretest calculated response with test data is presented. Additional calculations of component models are presented as an example of how they can be used to support design studies. Finally examples of progressive collapse computations of large, multi-floor, multi-bay buildings using simplified structural element representations will be demonstrated.