Analysis of anti-collapse performance of the multi-scale model of terminal building under blast loads

Zaigen MU*, Yuqing YANG, Yali CHEN

*University of Science and Technology Beijing, Beijing 100083, China
E-mail: zgmu@ces.ustb.edu.cn

Abstract

According to the characteristics of the terminal structure and the effect of blast loads, this paper reasonably determines the possible parts under blast loads of the anti-explosive key components of the long-span spatial steel structure. Through the study of the relationship among blast equivalent, blast distance and damage degree of structural members, the damage of key components and their adjacent components is determined. The multi-scale model was used to measure the collapse resistance of the terminal structure under blast loads. The analysis results show that the damage degree of the box-shaped steel column is mainly related to the blasting distance and the explosive equivalent. The deformation of the blasting surface is much larger than that of the back blasting surface. The damage degree of the oblique members is closely related to the incident angle of the explosion shock wave. In the multi-scale model, the shell element can be used to accurately simulate the damage of the component under blast loading. Due to the large redundancy of the vertical members of the long-span spatial steel structure, the residual bearing capacity still has a certain residual bearing capacity after the explosion, which can effectively suppress the development of the deformation.

Key words

Long-span structure, blast loads, anti-collapse performance, multi-scale model, finite element analysis

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