

学术论文

大跨度网壳结构强震失效机理研究

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摘要:

随着大跨度网壳结构近些年在重大工程中的大量应用, 该结构在强震作用下的失效机理问题也逐渐突出, 为空间结构学者所关注。在总结了近些年大跨度网壳结构强震失效机理领域的研究进展基础之上, 介绍了适用于网壳结构强震失效机理分析的基于荷载域全程响应的分析方法, 以及在该方法中引入材料损伤累积的研究过程; 定义了网壳结构在强震作用下的两类失效模式, 即由几何非线性引起的动力失稳和由过度塑性损伤导致的动力强度破坏; 论述了基于模糊数学中模糊综合判断理论的判别网壳结构强震失效模式的方法; 在此基础上, 对网壳结构动力损伤模型的建立也进行了阐述, 并对网壳结构在强震下失效极限的确定方法进行了总结。 图5表3参20

关键词: 网壳结构 强震作用 失效机理 动力强度破坏 动力失稳 损伤累积

Failure mechanism of large span reticulated shells subjected to severe earthquakes

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Abstract:

With the application of large span reticulated shells in significant projects, the fundamental theory of failure mechanism of such structures subjected to severe earthquakes becomes more and more important and is one of the primary concerns of the researchers. This paper systematically summarizes the research progress in the failure mechanism of large span reticulated shells under severe earthquakes in recent years. The analysis method reviewing full-range responses based on load domain is introduced, in which the material damage accumulation is included. The two types of failure modes of reticulated shells, dynamic instability due to geometrical nonlinearity and the dynamic strength failure attributable to over-plastic damage accumulation, are presented. This paper also presents the discrimination criterion of the failure modes of reticulated shells according to the fuzzy synthesis discrimination theory. Finally, the dynamic damage model of reticulated shells is illustrated and the determination methods of the ultimate load of reticulated shells subjected to severe earthquakes is summarized in this paper. 20Refs. In Chinese.

Keywords: reticulated shell severe earthquake failure mechanism dynamic strength failure dynamic instability damage accumulation

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