等直杆单元切线刚度矩阵的精确分析方法

Accurate analysis method on the tangential stiffness matrix of pinned straight rod element

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中文摘要：

　　为了有效完成大型铰接单层网壳结构的后屈曲分析，本文采用对杆单元杆端力函数求导的方法推导出了等直杆单元切线刚度矩阵的精确形式。该切线刚度矩阵不受结构小变形限制，适用于结构产生任意大结点位移情况。以六角星桁架、平面圆拱桁架和大跨K8单层网壳结构为算例，采用广义位移控制法进行非线性后屈曲分析，其中预测子采用本文杆单元切线刚度矩阵。算例分析结果表明，本文杆单元切线刚度矩阵在大型铰接单层网壳结构的非线性后屈曲分析中有很强的预测能力。

英文摘要：

　　In order to effectively complete post-buckling analysis of a large-scale single-layer reticulated dome,the exact formulation of the tangential stiffness matrix for the pinned straight rod element is achieved through derivation of the member end force vector with regard to the member displacement vector in this paper,which is suitable to any large nodal displacement of structure and avoid the limitation of small structure deformation.Star dome truss,planar circular arch truss and K8 single-layer reticulated dome are analyzed by combining the proposed pinned straight rod element tangential stiffness matrix with generalized displacement control method.The results have shown that the proposed pinned straight rod element tangential stiffness matrix has good capabilities for predicting large-scale single-layer reticulated dome post-buckling behavior.

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