

## 剛架移動模態計算及應用

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### 摘要

作剛架結構分析時，軸向變形束制是常使用的模式。可以減少自由度或計算量。可以避免因為數值較大的軸向勁度與數值較小的彎矩混合起來計算引起精準度的損失。

剛架結構在軸向變形束制條件下產生的模態形狀向量是此模式的關鍵物。本文採用特徵值問題法求解模態形狀向量。因各個模態形狀向量是剛架結構本身的特徵之一。先證明所求出的模態形狀向量為正確，再將它應用到剛架分析上。並以同餘轉換法作數值演算例。

由原先剛架結構推出類比桁架。對類比桁架之勁度矩陣作特徵值問題法求解。特徵值為零對應之特徵向量即為所求模態形狀向量。

關鍵字：軸向束制、模態形狀、特徵值問題、同餘轉換法

## MODE SHAPE ANALYSIS AND APPLICATIONS OF FRAME

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### Abstract

Mode shapes are the key characters of a frame analysis under axial constraint. The global stiffness matrix of analogous truss derived from the frame to be analyzed is calculated in the first step. To the stiffness matrix, the eigenvalue and eigenvector are to be determined. The eigenvalues of unstable truss are zeros. It means no external forces are needed. The corresponding eigenvectors are mode shapes. These mode shapes are the linear combination of mode shapes calculated by previous methods. Thus an easier and more convenience method are presented. In the example section, congruent transformation method is used to analyze the frame structure.

**Key Words:** axial constraint, mode shapes, eigenvalue problem, congruent transformation