MODELING OF PLANE STRUCTURES
HAVING NONPRISMATIC MEMBERS

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ABSTRACT

This paper presents an accurate method for the analysis of plane structures with nonprismatic members. This type of structures plays a dominating role in many applications such as warehouses, industrial buildings, bridges, etc. The stiffness matrix of a nonprismatic plane frame element is developed. The Gauss numerical integration method is used for the computation of the derived stiffness formulas of the nonprismatic elements. The relevant fictitious nodal forces for distributed loads on these members are obtained using the same numerical integration technique. The Displacement Method of structural analysis utilizing the developed stiffness matrix is coded in C programming language. Comparison of displacements and straining actions of nonprismatic members available in the literatures with those calculated using the present computer program validates the efficiency of the proposed method and proves that the results obtained in this work are more accurately than those provided by other conventional structural analysis computer programs.

Keywords: Nonprismatic elements; Frames; Stiffness; Numerical integration; Programming.

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