

Second Order Analysis of Frames Using Modified Newmark Method

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Abstract : The main purpose of this paper is to present the Modified Newmark Method as a method of non-linear frame analysis by considering the effect of the axial load (second order analysis). The discussion will be restricted to plane frameworks containing a constant cross-section for each element. In addition, it is assumed that the frames are prevented from out-of-plane deflection. This part of the investigation is performed to generalize the established method for the assemblage structures such as frameworks. As explained, the governing differential equations are non-linear and cannot be formulated easily due to unknown axial load of the struts in the frame. By the assumption of constant axial load, the governing equations are changed to linear ones in most methods. Since the modeling and the solutions of the non-linear form of the governing equations are cumbersome, the linear form of the equations would be used in the established method. However, according to the ability of the method to reconsider the minor omitted parameters in modeling during the solution procedure, the axial load in the elements at each stage of the iteration can be computed and applied in the next stage. Therefore, the ability of the method to present an accurate approach to the solutions of non-linear equations will be demonstrated again in this paper.

Keywords : nonlinear, stability, buckling, modified newmark method

Conference Title : ICCBE 2016 : International Conference on Civil and Building Engineering

Conference Location : Boston, United States

Conference Dates : April 25-26, 2016