World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:10, No:04, 2016

Investigation of Flexural – Torsion Instability of Struts Using Modified Newmark Method

Authors : Seyed Amin Vakili, Sahar Sadat Vakili, Seyed Ehsan Vakili, Nader Abdoli Yazdi

Abstract : Differential equations are of fundamental importance in engineering and applied mathematics, since many physical laws and relations appear mathematically in the form of such equations. The equilibrium state of structures consisting of one-dimensional elements can be described by an ordinary differential equation. The response of these kinds of structures under the loading, namely relationship between the displacement field and loading field, can be predicted by the solution of these differential equations and on satisfying the given boundary conditions. When the effect of change of geometry under loading is taken into account in modeling of equilibrium state, then these differential equations are partially integrable in quartered. They also exhibit instability characteristics when the structures are loaded compressively. The purpose of this paper is to represent the ability of the Modified Newmark Method in analyzing flexural-torsional instability of struts for both bifurcation and non-bifurcation structural systems. The results are shown to be very accurate with only a small number of iterations. The method is easily programmed, and has the advantages of simplicity and speeds of convergence and easily is extended to treat material and geometric nonlinearity including no prismatic members and linear and nonlinear spring restraints that would be encountered in frames. In this paper, these abilities of the method will be extended to the system of linear differential equations that govern strut flexural torsional stability.

Keywords : instability, torsion, flexural, buckling, modified newmark method stability
Conference Title : ICCBE 2016 : International Conference on Civil and Building Engineering
Conference Location : Boston, United States
Conference Dates : April 25-26, 2016