عنوان مقاله:

A study on effect of crack on free vibration of thick rectangular plate with initial geometric imperfection using differential quadrature method

محل انتشار:

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خلاصه مقاله:

In this study, vibration of initially imperfect cracked thick plate has been investigated using the differential quadrature method. The crack modeled as an open crack using a no-mass linear spring. The governing equations of vibration of a cracked plate are derived using the Mindlin theory and considering the effect of initial imperfection in Von-Karman equations. Differential equations are discretized using the differential quadrature method and are converted to a non-standard eigenvalue problem. Finally, natural frequencies and mode shapes of the cracked plate are obtained solving this eigenvalue problem. The accuracy of the proposed approach is verified using the results presented in other references. Various examples of the cracked plate problem have been solved utilizing the proposed method and effects of selected parameters such as crack depth, length and position have been checked. It is demonstrated that increasing the length and the depth of the crack decrease the plate stiffness and natural frequencies. Moreover, the effects of crack location on natural frequencies are more complicated, since they depend on the mode shapes, and when the crack is placed at a node-line, it will not influence the frequencies.

کلمات کلیدی:

Crack, Thick plate, Vibration, Differential quadrature method