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خلاصه مقاله:

The aim of this study is to introduce a method for crack detection and simultaneously assessing boundary conditions inbeams. This study suggests a method based on the effect of a concentrated test mass on the natural frequency that is definedas a stationary mass, which can be located in different positions of the beam and cannot be separated from the beam.Timoshenko beam theory is used to calculate the frequencies. In this method, a beam with the desired number of cracks ismodeled. The beam is divided into separated parts at crack section, which are joined together by elastic weightless torsionsprings, to avoid non-linearity effects; it is assumed that the crack is always open. At the first step, equations for a crackedbeam are extracted by considering the spring boundary conditions. Then, to verify the equations, numerical finite elementmodel is used. In this way, a new method is also applied to model the torsion springs in supports and it is shown thatsuggested model is acceptable. Eventually, the obtained responses are evaluated and the sources of errors are identified.To correct the existing errors, a modifying function is suggested. Finally, the inverse problem is solved.

کلمات کلیدی:

Timoshenko Beam Theory; Test Mass; Dynamic Characteristics; Cracked Beam; Spring Boundary Conditions