عنوان مقاله:

DIRECT AND INVERSE METHODS ON FREE VIBRATION ANALYSIS OF TIMOSHENKO BEAMS WITH AN ARBITRARY NUMBER OF CRACKS

محل انتشار:

کنفرانس ملی مهندسی مکانیک ایران (سال: 1392)

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

An analytical transfer matrix method is used to solve the direct and inverse problems of Timoshenko beams with an arbitrary number of cracks. The cracked beam is modeled as numbers of segments connected by two massless springs (one extensional and another one rotational). Considering the compatibility requirements on the crack section, the relationships between any two spans can be obtained. By using the analytical transfer matrix method, eigensolutions of the cracked system can be calculated explicitly. In an inverse problem, multi-crack detection for beams by natural frequencies has been formulated in the form of a non-linear optimization problem, and then solved by using the MATLAB functions. The equation is the basic instrument in solving the multi-crack detection of the beam. The set of crack parameters to be detected includes not only the crack position and depth, but also the quantity of possible cracks. The theoretical results are also validated by a comparison with experimental measurements.

کلمات کلیدی:

Inverse problem; Transfer matrix; Cracked Timoshenko beam; Natural frequencies