

Static and eigenvalue analysis of cracked Timoshenko beam by new macro element contained one crack

[,Mohsen Mehrjoo [- Department of Civil Engineering, Islamic Azad University Hamedan Branch, Hamedan, Iran

چکیده :

In this paper the finite element of beam element with a transverse crack is derived for fatigue and fracture applications. The new element is one-dimensional with an embedded edge crack in arbitrary position of beam element with any depth. The crack is not physically modeled within the element, but instead, its influence on the local flexibility of the structure is considered by the modification of the element stiffness as a function of the crack depth and crack position. The derivations are based on a simplified computational model, where each crack is replaced by a corresponding linear rotational spring, connecting two adjacent elastic parts. The components of the stiffness matrix for the cracked element are derived using the superposition principle, compatibility relations, and Betti's theorem. The stiffness matrix for transversely cracked beam element is derived and all expressions are given in symbolic forms. Models using the presented stiffness matrix are shown to produce accurate results, although with significantly less computational effort than physical modeling of the crack in 2D finite element models.

کلید واژه : one crack, Static analysis, eigenvalue analysis, Timoshenko beam, macro element

[برای دریافت اطلاعات بیشتر اینجا را کلیک کنید](#)