Abstract

Dynamic analysis of isotropic and composite plates containing through cracks are analyzed. Since regular finite element needs not only re-meshing at discontinuities, but also requires high mesh density at singularities, a search for an efficient numerical method is thus suitable. Because of its efficiency in not requiring re-meshing at singularities, the extended finite element method (X-FEM) is widely used in fracture mechanics problems. However and according to our knowledge, the XFEM has not yet been used in the dynamic analysis of cracked structures, subject of the present work. The analysis of dynamic behavior of isotropic and composite plates having a through crack located at various positions is conducted. At first, conventional FEM without any discontinuity is carried out; then, enrichment of nodal elements containing cracks is added to the FEM model. Various plates configurations with different kinds of boundary conditions and with different crack lengths and locations are considered. Primary observations show that the frequency of all the modes of vibration decreases with the increase of the crack length. This physical effect is more pronounced for some specific modes as it also depends on the nature of the singularity.