

SVR Infotech

XFEM based Fracture mechanics

Modeling of crack propagation with the Finite Element Method (FEM) is cumbersome due to the need to update the mesh to conform the geometry of the crack surface. Several FE techniques have been developed to model the cracks and their growth without remeshing. The extended Finite Element Method (XFEM) is one of the most popular and powerful methods developed based on enrichment strategy for finite elements on the basis of Partition of Unity Method (PUM). The XFEM enables accurate approximation of fields that involve jumps, kinks, singularities and any other non-smooth features within an element. This is achieved by adding additional terms called enrichment functions to the classical finite element solutions. The enrichment functions capture the non-smooth features independently of the mesh. In XFEM, a standard FE mesh for the problem is first created and the presence of crack is then represented independently of the mesh by enriching the standard displacement approximation with additional functions. In crack modeling, both discontinuous displacement fields along the crack faces and the leading singular crack tip asymptotic displacement fields are then added to the displacement based FE approximation through PUM.