

STUDY ON INTERACTION MECHANISM BETWEEN CRACK AND INCLUSION BY USING XFEM

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ABSTRACT

In the paper, the crack propagation path of a plate with multiple discontinuities (crack and inclusion) is evaluated by using extended finite element methods (XFEM). The level set functions are used to represent the existing crack and inclusion in materials. The mesh partition does not need to align with material interface and crack surface. For the plate with a soft inclusion, the crack initially curved towards the inclusion. Then, the crack reoriented itself and propagated almost horizontally along length of the plate. Compared with the plate without inclusion, for the plate with a hard inclusion, only a slight difference of crack path can be investigated.

A plate with an edge crack and a circular inclusion of radius 3.45 mm shown in Figure 1 is considered. Figures 2 show the crack paths predicted by using XFEM.

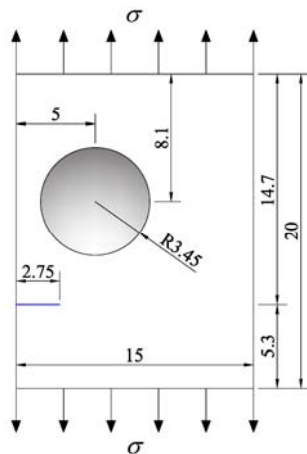


Figure 1. A plate with an edge crack and a circular inclusion (Unit: mm)

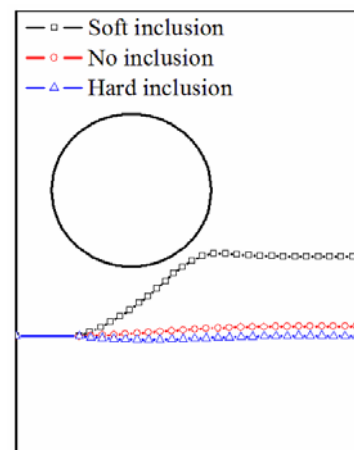


Figure 2. Crack path deflection because of a inclusion