

A Further Investigation of Elastoplastic Crack in Circular Ring

楊立杰, 羅鵬飛

Applied Statistics

Management

young@chu.edu.tw

Abstract

The location of a outer crack can strongly affect the sequence of plastic hinge development which in turn affects stability of a circular ring which has been obtained theoretically in Young [1] and numerically in Young [2] but not any experimentally. Therefore, the primary purpose of this paper is to demonstrate the result experimentally. In addition, it is important that the crack of some circular specimen in industry might occur in the inner surface of the ring, i.e. the inner crack. The second purpose of this paper deals with the effects of inner crack by using the Boundary Element Method (BEM). As the matter of fact, the boundary conditions in Young [1] and [2] are diametrically concentrated compressions. It means that the inner crack will be closed mostly. In this condition the compressions will be replaced by tensions and therefore, the crack opening can be ensured. The crack stability will be judged on the basis of the linear elastic fracture mechanics. The experimental method, of course, will prove the theoretical and numerical results which were done previously. This study also shows the potential application of the BEM determining the effect of the inner crack of the circular ring.

Keyword : Boundary Element Method