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FATIGUE CRACK GROWTH AND LIFE PREDICTION ANALYSIS OF POWER PLANT COMPONENT USING LEFM APPROACH

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Abstract

In the present investigation, the fatigue crack growth behaviour of surface cracked piping component are performed on the basis of the linear elastic fracture mechanics principles with particular interest in its ability and accuracy to predict full scale component tested experimental data. Especially the stress intensity factors available in the literature are evaluated to predict the crack growth behaviour of the component using the specimen tested material data. It is concluded that the available SIF solutions like ASM and Bergman for external surface cracked straight pipe case having the semi-elliptical crack profile over-predicts the fatigue life of the component when having constant crack depth profile. In case of PBSC 8-3 pipe, it can be seen in Fig.2 that using Bergman solution the SIF results at the deepest point is higher as compared to respective solution of ASM Handbook. It can also be observed for case PBSC 8-3 that the Bergman solution predicted lower values of surface SIF as compared to ASM solutions. Fig.3 showed the comparison of predicted crack growth behaviour of pipe PBSC 8-3 case with the experimentally determined results.

Keywords : Fatigue; Paris equation; Stress intensity factor solution; Crack growth behavior; Power plant component.