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Analysis on Crack Growth and Fatigue Life of Welded Bridge Components with Initial Crack

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This work aims to investigate the behavior of crack growth and assess fatigue life of welded components with initial crack in bridges under traffic loadings. It is assumed that fatigue crack in welded bridge components remains semi-elliptical shape during crack propagation. Considering the damage evolution on the tip of cracks and its influence on crack propagation, the equation of crack propagation is deduced on the basis of the theory of continuum damage mechanics and fracture mechanics for welded bridge components under traffic loading. The method on calculation of stress concentration factor for welded components is then improved by using the geometric shape factors from the BS7910. The proposed method is adopted to calculate crack growth and fatigue life of two types of welded specimens with experimental results. The calculated result shows that the proposed method is reasonable and some of useful results on behavior of fatigue crack growth are obtained.

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