

عنوان مقاله:

Studying the Residual Stress Distribution of Cold Expanded Hole During the Crack Growth

محل انتشار:

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خلاصه مقاله:

Cold expansion is a technique for creating residual stress field around hole of joints and is used not only for manufacturing anti-fatigue products but also for renovating in-service joints. Numerical investigations based on finite element methods are implemented to obtain residual stress distribution which is used to predict fatigue life of joints. Estimated fatigue life in high level cold expanded joints shows different results than experimental tests. On prediction methods, all the calculations are based on primary results which obtained by FE simulations, whereas stress distribution is affected by crack initiation and propagation; therefore it is important to study the effect of crack growth on residual stress distribution to predict accurate results. In this paper the effect of crack growth on residual stress distribution caused by cold expansion is investigated. For this goal a holed joint of T3-2024 aluminum alloy is selected. A three dimensional finite element model is used to simulate the cold expansion process and estimate residual stress distribution. Then element birth and death technique is implemented to simulate crack growth. Results showed that crack growth has noticeable effects on residual stress distribution. Compressive residual stress is decreased on crack tip whereas it is increased around crack tip.

کلمات کلیدی:

Cold Expansion, Residual Stress, Crack Growth, Element Birth and Death

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