

Estimation of Probabilistic Fatigue Crack Propagation Models of AZ31 Magnesium Alloys under Various Load Ratio Conditions by Using the Interpolation of a Random Variable

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Abstract : The essential purpose is to present the good fatigue crack propagation model describing a stochastic fatigue crack growth behavior in a rolled magnesium alloy, AZ31, under various load ratio conditions. Fatigue crack propagation experiments were carried out in laboratory air under four conditions of load ratio, R , using AZ31 to investigate the crack growth behavior. The stochastic fatigue crack growth behavior was analyzed using an interpolation of random variable, Z , introduced to an empirical fatigue crack propagation model. The empirical fatigue models used in this study are Paris-Erdogan model, Walker model, Forman model, and modified Forman model. It was found that the random variable is useful in describing the stochastic fatigue crack growth behaviors under various load ratio conditions. The good probabilistic model describing a stochastic fatigue crack growth behavior under various load ratio conditions was also proposed.

Keywords : magnesium alloys, fatigue crack propagation model, load ratio, interpolation of random variable

Conference Title : ICMEAM 2014 : International Conference on Mechanical Engineering and Applied Mechanics

Conference Location : Istanbul, Türkiye

Conference Dates : February 17-18, 2014