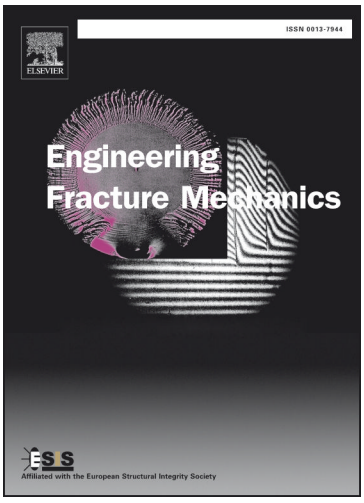

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Stress Intensity Factor Solutions for Fretting Fatigue using Stress Gradient Factor

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ABSTRACT

This paper presents stress intensity factor (SIF) solutions for fretting fatigue conditions by including a stress gradient factor (SGF) to correct the classic geometry factor for tension semi-infinite strip (TSIS) specimen. This gradient factor considers the stress gradient due to the pressure of the pad on the surface of the specimen, which creates a high concentration of stresses around the contact of the bodies. To obtain these solutions, 2D finite element model simulations were performed varying important fretting parameters, namely: coefficient of friction, bulk stress intensity, pad radius and material. All configurations respected a partial slip contact condition and the results obtained show agreement with the ones obtained analytically. Weight functions were used to obtain stress intensity factors under mode I, then to compute the SGF, which were fit into equations with a unique structure, varying only coefficients. To consider real problems, a 3D correction factor was introduced. The final SGF presented a general form to compute SIF under fretting conditions when applied in suggested methods, such as: Strain-based Fracture Mechanics, Theory of Critical Distances (TCD) and Stress Gradient.

Keywords: Fretting Fatigue, Weight Function, Stress Intensity Factor, Stress Gradient Factor.

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