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FATIGUE CRACK GROWTH IN A COMPACT TENSION SPECIMEN WITH HETEROGENEOUS MEDIUM USING DUAL BOUNDARY ELEMENTS METHOD

MATHEUS H. LISBOA[*], ADRIAN A. BETANCUR[†], CARLA T. M. ANFLOR[†]

[*,†]Grupo de Mecânica Experimental e Computacional (GMEC)
Universidade de Brasília
Campus Gama – Área Especial de Indústria 1 – Setor Leste – Gama – DF- Brasil – 72444-210
e-mail: matheus14@gmail.com, anflor@unb.br

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Abstract. This work presents a study in fracture mechanics that, using the Dual Boundary Elements Method, a crack growing in a heterogeneous medium was evaluated. A two dimensional (2D) plate was considered, which presents a matrix with inclusions of another material embedded in it. To evaluate the effects of these inclusions inside the domain, the Representative Volume Element (RVE) technique was implemented in front of the crack tip in order to predict the effective mechanical properties of the considered material, and then, with the effective properties, a crack growth simulation was made. Looking forward to posterior comparison of results obtained numerically with data from experimental tests, the plate's considered geometry is equivalent to a Compact Tension C(T) test body which is used in tests that determine the steady-state fatigue crack growth rate in ASTM standards. The material simulated is a nodular cast iron which contains a ferritic matrix and circular graphite inclusions. To determine the Stress Intensity Factors (SIF) and for a better analysis of the stress field near the crack tip, the J-Integral was used to evaluate the plastic zone in it. The crack path and SIFs obtained after the numerical analysis seem to be in good agreement with the theory.