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AN IMPROVED METHODOLOGY FOR THE DOUBLE TORSION LOAD-RELAXATION METHOD

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The implications on data inversion of the exhaustive three-dimensional finite-element analysis recently performed by Ciccotti (1999) on double-torsion load-relaxation constant-displacement fracture propagation specimens are analyzed. The results are presented in terms of corrective coefficients to the classical analytical approach developed by Evans in 1972. A full methodology is developed for the numerical implementation of such corrections which are found to be substantial. Numerical simulations show in fact that the classical analysis of Evans underestimates the stress-corrosion index up to 30% even if the most conservative operational constraints are adopted. On the contrary, the operational constraints can be comfortably relaxed as a consequence of the capability of correcting the effects of the different experimental parameters. The effectiveness of the method was tested with some experiments on plexiglass specimens in which crack propagation could be easily monitored.

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