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Numerical simulation of the fracture behavior of aluminum alloy welds: Al6061-T6

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Abstract : Welding is used to realize permanent assembly in mechanical structures to assure the continuity of the parts to be assembled contrary to the other assembly techniques which have physical or chemical discontinuities. Generally, crack evolution depends on several intrinsic and extrinsic parameters of material. The aim of this work is to analyze the severity of crack defects on the mechanical behavior of Welded joints. The cracks are considered located in the weld metal. The J-integral method was used to analyze the fracture behavior of these structures by the two-dimensional finite element method using Cast3M code. The effect of the mechanical properties, the mismatching and the crack size on the J-integral values was highlighted. A good correlation between the FEM simulations and the literature analysis results was observed. We note that the loading mode affects directly the J-integral value and consequently on the mechanical behavior of the welded joint.

Keywords : J-integral, welding, fracture, plastic behavior, finite element analysis.