Abstract

This thesis presents a technique, based on Neuber-Radaj's local stress theory and valid for every joint shape and load condition, that permits to evaluate the fatigue strength of fillet welded joints with the finite elements method. According to the standard Radaj's procedure, the joint substructures have to be solved in series, on the contrary we show that is possible and even suitable to study the global model and the submodel in parallel. Model and submodel are uncoupled by an algorithm based on the principle of linear superposition, which allows to decompose any load condition of the joint in the linear combination of elementary load conditions. An implementation of this technique on ANSYS finite elements code is showed as an example. Referring to the standard Radaj's procedure, this algorithm permits, with the same computation cost, to appreciably improve solution speed, method convergence and resolution of the fatigue stress intensification coefficient K_f over the joint. This technique, valid for any two-dimensional submodel, is potentially extensible to three-dimensional submodels.