SM9S_11087

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Three-Dimensional Correction of Two-Dimensional Fracture Criteria Using a Constraint Factor

Rimantas Kacianauskas, Vladislav Zarnovskij, Eugenius Stupak

Vilnius Gediminas Technical University, Department of Strength of Materials, Vilnius, Lithuania

Correction of the originally two-dimensional (2D) fracture criteria used in linear fracture mechanics is considered. The three-dimensional (3D) stress state at the crack tip is transformed into quasi-two-dimensional one by introducing effective elasticity constants governed by the stress and/or strain constraint factors (SCF). It is shown, that the variation of the stresses and, as a consequence, of the fracture criteria along the crack front is predicted by the variation of the SCF, while 3D correction may be defined by integrating of SCF along the crack front. The proposed approach is illustrated by the examination of the stress intensity factor and energy release rate in a single edge notch bending SENB specimen and proved by the results obtained using a direct 3D finite element simulation.

View the extended summary