

Fatigue failure analysis using the theory of critical distance

Abstract

This paper explores the initial potential of theory of critical distance (TCD) which offers essential fatigue failure prediction in engineering components. The intention is to find the most appropriate TCD approach for a case of multiple stress concentration features in future research. The TCD is based on critical distance from notch root and represents the extension of linear elastic fracture mechanics (LEFM) principles. The approach is allowing possibilities for fatigue limit prediction based on localized stress concentration, which are characterized by high stress gradients. Using the finite element analysis (FEA) results and some data from literature, TCD applications is illustrated by a case study on engineering components in different geometrical notch radius. Further applications of TCD to various kinds of engineering problems are discussed.