

Elastic contact analysis of functionally graded brake disks subjected to thermal and mechanical loads

Abstract

In this paper, finite element contact analysis of a functionally graded (FG) brake disk in contact with a pad, subjected to rotation, contact pressure, and frictional heat, is presented. The material properties vary through the thickness according to a power-law characterized by a grading index, n . The contact surfaces are full-ceramic with full-metal free surface. The effects of n on the displacement, contact status, strain and stress are investigated. From the analysis, thermo-elastic and contact results are extremely dependent on n . Hence, n is an important criteria for the design of FG brake disks for automotive and aircraft applications.

Keyword: Functionally graded material; Contact condition; Bending load; Finite element method; Thermo-elastic analysis