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A FINITE ELEMENT SIMULATION OF DISC BRAKE HOT BAND MIGRATION

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ABSTRACT – The migration of hot banding is the phenomenon whereby hot bands or hot spots on the brake disc surface periodically migrate radially inward and outward. These migrations can cause the undesired brake torque variation (BTV) and further induce vibration problems such as brake judder. To investigate the forming and migration of hot banding problem, transient thermal mechanical finite element models of repetitive braking considering the effects of wear have been performed. The displacement, temperature, stress, and contact pressure distribution against time were obtained in this model. The thermal buckling, thermo-elastic instability (TEI) and hot band migration phenomena have been captured and investigated. The results suggest a cause-effect chain of radial hot band migration. Its determinants include mechanical loading, disc thermal buckling, and most importantly the transient interactions between TEI and wear.