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ANALYSIS OF THE INTERFACE HEAT PARTITION IN A FRICTION BRAKE SYSTEM WITH 2D FE MODELS

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ABSTRACT
A 2D finite element model of frictional heating in a pad-disc brake system is proposed to observe and analyse heat partition and heat flux at the interface during brake. A formulation of friction heat generation during braking with a constant velocity is presented, and the thermal contact resistance on a contact surface is simulated by ABAQUS with different thermal contact conductance/clearance settings. The heat partition at contact surface is analysed. Results show that the heat partition along the interface is affected by the interface contact pressure and the thermal contact conductance. It shows that at normal thermal contact conductance condition, which is about 10^4 w/m^{2}k for friction brake applications, the heat partition, the interface temperature becomes sensitive to the interface pressure variation, in comparison with that under ideally high thermal contact conductance condition (or low thermal contact resistance condition), which is over 10^6 W/m^{2}k. The comparison between results from different interface thermal conductance models can not only support the further analysis on ideally high thermal conductance applications but also indicate parameters which are neglected in those high thermal conductance applications. This is also a powerful support of material selection in the area of brake system material development.