عنوان مقاله:

Transient temperature field analysis of a wheel in block braking using two different 2-D finite element modeling

محل انتشار:

نویسندگان:

Asghar Nasr - *Assistant Professor, School of Railway Engineering, Iran University of Science and Technology, Tehran, Iran;*

Mohsen Hosseinpour - *Research Assistant, School of Railway Engineering, Iran University of Science and Technology, Tehran, Iran;*

خلاصه مقاله:

Rail brake system is one the most important components in rolling stock from safety, reliability and economic point of view. Different types of air brake systems are used in rail systems of which disc braking and block braking are the most common practices in both passenger and freight cars. The main problem with block braking is excessive heat generation in the wheels which might cause some damages to wheels and rails. This requires more intense research work to be done for different braking conditions. The thermal analysis of wheel under braking is of high importance in rail brake research. In this paper, two different 2-D dimensional finite element models are introduced to predict the precise temperature field of the wheels. In model one (axisymmetric model) a uniform heat flux is assumed in the circumferential direction, while a non-uniform (variable) heat flux is considered in the second model. The uniform model can be used for predicting the nominal temperature of the wheel whereas the non-uniform model is capable of predicting the local temperature of the wheel tread. These models are verified by an analytical model which have been validated by the results of previous investigations. The results of this paper prove the introduced models are accurate enough for wheel temperature prediction. Model one is a simpler and more low-cost analysis to predict the temperature field of the wheel in comparison to the second model which requires very small time increments.

کلمات کلیدی:

block braking, thermal analysis, finite element, rail braking

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