

عنوان مقاله:

Nonlinear J integral evaluation for a cracked railway wheel under thermal load of braking

محل انتشار:

ششمین کنفرانس بین المللی پیشرفتهای اخیر در مهندسی راه آهن (سال: 1398)

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خلاصه مقاله:

In this paper, a cracked railway wheel is studied and effects of some effective factors such as thermal loads of braking, modeling of rail and brake blocks and strain hardening on the obtained results is considered. Wheels in the railroad vehicle are one of the most critical components due to their rotation and fatigue nature of their applied load. One of the most commonly encountered injuries to the wheels is the nucleation and growth of fatigue cracks in them. In this paper, a cracked wheel with two brake shoes and a part of the rails are modeled, and the wheel rotation, the axial load of the wheel, the braking pressure applied during braking process and the increase in the temperature of the components due to braking is considered. Since the wheels are subject to fatigue loading and the property of the material is a type of elastic-plastic material, the study of crack growth in them is necessary because in the case of cracks in the wheel and reaching to their critical lengths, the failure of the wheel will be occurred. This is one of the important reasons for the incident and accidents and derailment of trains. Investigation of Crack growth in wheels is done by two major methods of linear elastic fracture mechanics (LEFM) and elastic-plastic fracture mechanics (EPFM), each of which has its own specific conditions. In this paper the nonlinear J integral method is used for indicating and predicting the crack behavior. The results show the importance of thermal loads of braking and strain hardening on the value of J integral. Also modeling of rail and brake shoes eliminates the need to use the Hertz theory of contact and gives more accurate answers.

کلمات کلیدی:

Thermal load, J integral, EPFM, Crack, Railway wheel

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