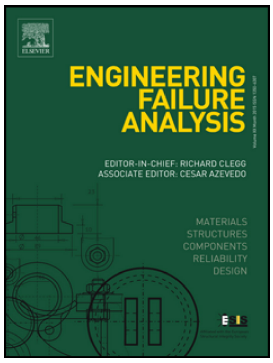

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Meshing characteristics of spur gear pair under different crack types

Zhanwei Li[1], Hui Ma[1,2*], Mengjiao Feng[1],Yunpeng Zhu[3] Bangchun Wen[1]

1. *School of Mechanical Engineering and Automation, Northeastern University, Shenyang, Liaoning 110819, P R China*

2. *State Key Laboratory of Mechanical System and Vibration, Shanghai Jiao Tong University, Shanghai 200240, P R China*

3. *Department of Automatic Control and Systems Engineering, The University of Sheffield, Sheffield S1 3JD, UK*

Abstract

The effects of three different gear crack types such as, for example, the crack along tooth width uniformly and the crack propagating in the depth direction (crack type 1, CT1), the crack along tooth width non-uniformly and the crack propagating in both the depth and the tooth width directions (crack type 2, CT2), and the spatial crack propagating in the depth, the tooth width and the tooth profile directions (crack type 3, CT3) on the time-varying mesh stiffness (TVMS) of spur gear pairs are investigated in this study. Firstly, an analytical model for studying these three types of cracks is established based on potential energy method. A finite element (FE) model of the cracked spur gear pair is also built in the ANSYS software as well. In order to verify the analytical method, the TVMS obtained from analytical method is compared with that obtained from FE method under different crack types. Moreover, the effects of the depth, the length and the height of crack are discussed. The equivalent stress, contact pressure and displacement of tooth are also analyzed under different crack types by using the FE method. The results show that the effect of crack depth on TVMS is the largest, while that of the crack height is the

* Corresponding author. Tel.: +86 24 83684491; fax: +86 24 83684491

E-mail address: mahui_2007@163.com (H. Ma)