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EFFECTS OF SURFACE ROUGHNESS ON LOCAL FRICTION AND TEMPERATURE DISTRIBUTIONS IN FRETTING CONTACTS

W. Qin [a, b*], X. Jin [a], A. Kirk [a], P. H. Shipway [a], W. Sun [a]
*Wenjie.Qin@nottingham.ac.uk
[a] Faculty of Engineering, University of Nottingham
Nottingham NG7 2RD, UK
[b] School of Mechanical Engineering, Beijing Institute of Technology
Beijing 10081, China

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ABSTRACT
Friction will result in power dissipation in fretting process and then induce temperature rise in fretting contacts which is known to affect the fretting wear behaviour of metals [1]. It has been found that initial surface roughness has significant influences on friction [2] and flash temperature rise in contact [3], which are believed to be very difficult to be measured by experiments.

In this paper, the dynamic local contact friction force and temperature distributions in fretting contacts during the fretting process are investigated by finite element (FE) method taking into account the initial surface roughness. The roughness of contact surfaces is characterized as fractal surfaces by the Weierstrass-Mandelbrot (W-M) function [4], and the finite element model including the contacting bodies with rough surfaces is developed according to a cylinder-on-flat configuration, see Fig. 1, which was used in the fretting wear experiment. An example of surface roughness characterization using the W-M function is shown in Fig. 2. The FE analyses were carried and the simulated results obtained can be used to identify the possible variations of local contact friction and local temperature rise due to varying surface roughness of the specimens.

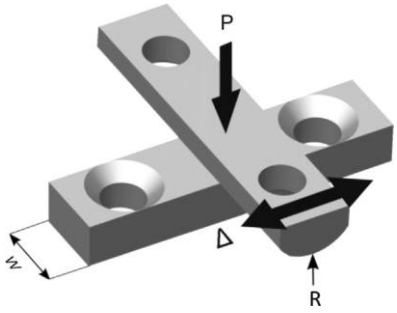

Fig.1 Cylinder-on-flat configuration for fretting test

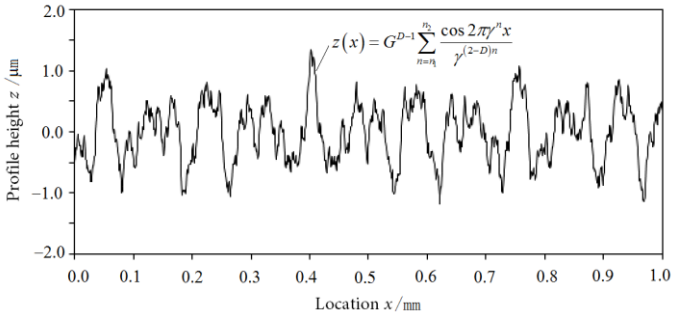

Fig. 2 Surface roughness characterization

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