RESEARCH ON MAGNETIC MEMORY TESTING TECHOLOGY IN EVALUATING WEAR PHENOMENA AND WEAR MECHANISM

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ABSTRACT

The 40CrMo block specimen and the 316L pin specimen which constituted a pin–on–block friction pair were used for the friction magnetic memory test in the geomagnetic field. The relationship between the surface magnetic memory signals in the process of friction and wear phenomena, wear mechanism was investigated. The results showed that according to the changes of the magnetic memory signals tribo-magnetization was a four-stage process and wear phenomena and wear mechanism were also transformed at the demarcation points of these four stages.

friction and wear test; magnetic memory signals; wear phenomena; wear mechanism

INTRODUCTION

Metal magnetic memory testing technology (MMM) as a new nondestructive testing technology has widely been paid attention. Numerous experiments are carried out to study MMM under different stress conditions such as tension, pressure, bending, torsion and shock. However, studies about using MMM to evaluate wear phenomenon and wear mechanism are very limited[1]. This paper was devoted to research on the tangential magnetic memory signals in the friction process and the relationship between the magnetic memory signals and wear phenomenon and wear mechanism.

EXPERIMENTAL METHOD

The experiments were performed under dry sliding condition at a room temperature in the geomagnetic field. The friction and wear test was carried out with a normal load of 60 N and a mean velocity of 1 Hz until the reciprocating movement was repeated 10000 times. The tangential magnetic memory signals of the specimens were measured by a giant magnetoresistance-type magnetic sensor which had a higher sensitivity.

EXPERIMENTAL RESULTS AND DISCUSSION

Fig.1 shows the curves of the average of the tangential magnetic memory signals under the different sliding circles. It can be seen from the Fig.1 that wear phenomenon transforms at the three transition points (G-point, H-point, I-point) of the magnetic memory signals. At the G-point, the magnetic memory signals started to increase rapidly and wear scar was generated. To the H-point, the magnetic memory signals began to increase slowly and the area of wear scar reached the maximum. After the I-point, the magnetic memory signals remained constant and the depth of wear scar kept unchanged.

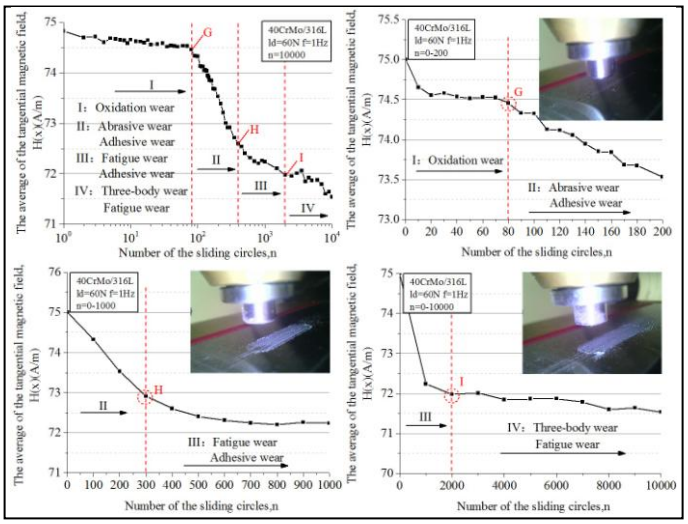

Fig.1 The average of the tangential magnetic memory signals under the different sliding circles

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