

Effect of Corrosion on Fretting Wear Morphology and Mechanical Behaviors of Wires

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Abstract. Corrosion and fretting wear inevitably occur in wires, which are important parts of cables. To study the wear morphology and surface mechanical behavior of wires for different fretting and corrosion times, a simulation model of fretting wear of wire with different corrosion conditions is established by using MATLAB and ABAQUS softwares. First, according to the surface roughness of wires under different corrosion times, the node coordinates of the simulation model are changed to simulate different rough surfaces. Secondly, the wear characteristics of wires under different fretting cycles are obtained by using cycle jump in a user subroutine in ABAQUS. Finally, the numerical model is validated using experimental data. The results show that when the corrosion time is 0 h, the wear area has a regular oval shape. The wear volumes of wires with corrosion times of 120 h and 480 h are the largest and the smallest, namely $3.55 \times 10^{-4} \text{ mm}^3$ and $2.7 \times 10^{-4} \text{ mm}^3$, respectively. As wear volume increases, both residual surface contact pressure and stress decrease. When the corrosion time is 0 h and 120 h, the residual surface contact pressure is maximum and minimum, respectively.