

纵向表面粗糙度对滚子副乏油润滑性能的影响 Effects of Longitudinal Surface Roughness on the Lubricating Performance of Starved Roller EHL

Contacts

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关键词: 滚子副 粗糙度 乏油 润滑性能

摘要: 对全膜及乏油条件下纵向粗糙度滚子副弹流润滑问题进行了求解。结果表明, 滚子接触副中部与端部的润滑特性不同, 由于端部效应的存在, 其端部油膜厚度远低于中部。表面粗糙度会引起油膜厚度及压力的波动, 在纯滚动条件下, 油膜波动的波长等于粗糙度的波长, 而幅值大于粗糙度的幅值。表面粗糙度会降低油膜厚度, 尤其在乏油润滑条件下。供油膜厚越小, 滚子接触副越容易乏油。在一定供油量下, 表面粗糙度的幅值越大, 波长越小, 对滚子副的润滑越不利。 Numerical solution for the roller elastohydrodynamic lubrication (EHL) contacts with longitudinal surface roughness under fully flooded and starved conditions was obtained. The results showed that the lubricating performance in the middle and the end parts of the roller was different. Owing to the side leakage effect, the film thickness at the end parts of the roller was much lower than that in the middle part of the roller. Oscillations of the film thickness and pressure could be caused by the surface roughness. Under pure rolling condition, the wavelength of the film oscillation equaled the wavelength of the surface roughness, while the amplitude was larger than that of the roughness. Surface roughness could reduce the film thickness, especially for the starved EHL contacts. The smaller the thickness of the oil supply layer was, the easier the starvation in the roller contact could be. In addition, when the oil supply quantity is specified, larger amplitude and smaller wavelength are more harmful to the lubricating performance of the roller contacts.

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