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Effects of surface texture on journal-bearing characteristics understeady-state operating conditions

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Abstract: Developments in microscopy have a profound effect on the resurgence of tribological applications at themicroscopic level. Using surfaces with controlled micro geometry may prove an effective approach toimproving bearing performance. It is consequently of interest to study the lubrication of journal bearingsystems taking into consideration the effect of surface geometry design. A numerical approach is used in analysis of texture effects on bearing characteristics. The results from investigating the performance of bearing surfaces with spherical dimple textures suggest that contact characteristics such as minimumfilm thickness, maximum pressure, axial oil film flow, and friction torque may be improved through anappropriate surface texture geometry and appropriate textures distribution on the contact surface. Themain purpose of our work is to model and understand the evolution of journal-bearing characteristics withtextures. A rigorous methodology is recommended. The work is divided into two steps. The first oneserves to quantify the evolution of the characteristics with the texture parameters and to deduce theiroptimized values. The second step enhance the performance of the journal bearing by progressivelytaking into account the optimized values of texture parameters, especially the textures disposition.

Keywords : textured surface, dimples, Hydrodynamic lubrication, journal bearing, Finite difference method