

Performance evolution of fully and partially textured hydrodynamic journal bearings lubricated with two lubricants

N. Tala-ighil, M. Fillon

Abstract: This study investigates the evolution of the main bearing performance of partially and fully textured hydrodynamic journal bearing. The viscosity effect is also analysed by the mean of numerical simulations for two types of oil: the oil 1 (ISO VG 32, 31.3 cSt at 40 °C) has a lower viscosity than oil 2 (ISO VG 100, 93 cSt at 40 °C). Reynolds equation is solved by finite difference and Gauss-Seidel methods with over-relaxation for various operating conditions. It is shown that, under hydrodynamic lubrication regime, the improvement of the most important characteristics (the friction coefficient and minimum film thickness) of a textured journal bearing depend strongly on the lubricant viscosity and the journal rotational speed. The fully textured journal bearing is highly favorable at very low speeds while the partially textured journal bearing is more suitable for slightly higher speeds. The gain in bearing performance due to the texturing of the bushing disappears at a critical speed of the journal and then, for higher rotational speeds, the presence of textures becomes detrimental.

Keywords : journal bearing, texture, hydrodynamic, lubrication