Short Journal Bearings With Misaligned Axes

J. Gomez-Mancilla, Valery R Nosov
Laboratorio Vibrs. & Rotordinamica, SEPI-ESIME, Edif. 5, 3er Piso
Instituto Politecnico Nacional, U.P. Zacatenco, México D.F., MEXICO
gmancill@hotmail.com**, tel. (52)5729-6000 ext. 54737**

ABSTRACT
An analytical solution for misaligned journal-bearing axes short bearing at its steady-state is obtained. The solution is expanded in series over a small parameter ***a,*** which characterize the non parallelism of journal-bearing axes, such that its zero order term corresponds to the Ocvirk solution [2,3]. Also lubricant film average pressure, projections of fluid forces acting on the journal and moments from these forces are calculated. When comparing misaligned average film pressure and resulting forces acting on the journal to that of a parallel journal-bearing axes, they differ only in second order terms of ***a****,(i.e., $O(a^2)$*. That is, for a misaligned case, when neglecting the temperature increase and consequent reduction in Sommerfeld number effects, the bearing load capacity to a first approximation is maintained and its influence can be neglected. On the contrary, journal force moments are strongly influenced by the bearing axial length, and have a first order dependence on ***a****.* Axes offset misalignment is not studied since it can be straightforward accounted for by imposing an additional radial displacement on the equilibrium eccentricity. Expressions here derived provide the opportunity to reduce vibrating effects through control counterbalance and adequate injection commands at the short bearings, estimated through vibration amplitudes and corresponding counter-balancing moments. Using data from Bently Nevada RotorKit a simple misaligned axes example due to weight sagging is given.

Key words: journal bearing, axes misalignment, series expansion, misaligned force, misalignment moments