Stability Analysis of Three-Lobe Journal Bearing Lubricated with a Micropolar Fluids

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Abstract : The dynamic characteristics of a three-lobe journal bearing lubricated with micropolar fluids are determined by the linear stability theory. Lubricating oil containing additives and contaminants is modeled as micropolar fluid. The modified Reynolds equation is obtained using the micropolar lubrication theory and the finite difference technique has been used to solve it. The dynamic characteristics in terms of stiffness, damping coefficients, the critical mass and whirl ratio are determined for various values of size of material characteristic length and the coupling number. The computed results show compared with Newtonian fluids, that micropolar fluid exhibits better stability.

Keywords : three-lobe bearings, micropolar fluid, dynamic characteristics, stability analysis
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