# Dynamic Characteristics of Tilting 12-Pad Journal Bearing

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Radial, tilting-pad journal bearings are generally applied in high speed rotating machines operating at small and mean stationary loads and the peripheral speeds of journal reaching 150 m/s. These bearings have good stability at high speeds, are less sensitive to the load direction and shaft misalignment compared to the multilobe bearings. They allow for minimising of oil flow and for using the standard components; spares consist of pads only. One of the advantages of tilting-pads bearings is the progressive increase of the assembly stiffness with geometric preload, and either the matching or elimination of cross-coupled stiffness.

The tilting-pad bearings are the bearings, which have separate pads and the space between single tilting-pads effects the bearing operation. The number of tilting-pads can be basically 3 to 5 depending on the required operating parameters of rotating machine. The operating surfaces of tilting-pads are the cylindrical ones with the pivot centred on the pad arc or displaced in the direction of journal rotation from the pad centre. The tilting 12-pad journal bearings have found application in the turbines of hydroelectric power plants as the radial bearings of vertical rotor.

The motion of the journal centre in the clearance circle of the bearing bush causes the variations of the resultant force acting on the journal. The components of oil film force are expressed as functions of journal co-ordinates (eccentricity and attitude angle) and its velocities. The increments of the resultant force, after expansion in the Taylor series of the first order, are defined as the stiffness and damping coefficients. These coefficients of oil film can be determined by differentiation of the oil film force.

The paper introduces the results of calculation of bearing dynamic characteristics obtained for the tilting 12-pad journal bearings with two length to diameter ratios, different relative clearance of the pad and at symmetrical support of the pads. The pad inertia effects were neglected. The direction of the load has been chosen as vertical – load on the pad. The tilting 12-pad journal bearing stiffness and damping coefficients were presented as functions of Sommerfeld number.

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