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ROLLING ELEMENT BEARINGS

97-1512
On the Finite Element Representation of Hydrodynamic Bearings
Meggiolaro, M.A., Almeida, C.A.
Pontificia Univ. Católica, Rio de Janeiro, Brazil
Proc. 7th Intl Conf. Dynam. Problems in Mechanics, Spons. Brazilian Soc. Mech. Sci (ABCM), Rio de Janeiro, Brazil, Mar 3-7, 1997, pp 184-186, 3 figs, 3 refs

KEYWORDS: Mechanical components, Rolling element bearings, Shafts, Rotors, Rotating machinery

Presented is a numerical formulation for the representation of hydrodynamic bearings for finite element modeling of a shaft-rotor-bearing type rotating system. This system dynamic response is affected significantly by the reaction forces on the bearings, which are dependent on the shaft transverse displacements, transverse linear velocities and angular velocity. Hydrodynamic bearing relations are, thus, represented through the equation of Reynolds which, under the Ocvirk simplified conditions for short length bearings, provides a closed form solution for the oil pressure distribution. This pressure distribution is integrated over the bearing surface allowing for the calculation of nonlinear stiffness and damping matrices associated to the shaft finite element degrees of freedom, at the bearing nodal point.