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THE INTEGRATION OF STRUCTURAL AND FLUID FILM DYNAMIC ELEMENTS IN FOIL BEARINGS PART I: PAST APPROACHES TO THE PROBLEM

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ABSTRACT

A review was conducted on work done in the past on the performance of foil bearings. The main aim of the survey was to see how the two-tiered construction of foil bearings, consisting as they do of two generically disparate elements, one hydrodynamic in nature and the other following the laws of elasticity, have been modeled in order to obtain integrated values of bearing stiffness and damping. A compilation was made of the parameters and processes inherent in the operation of foil bearings, including the kinematics of the bump foil and the accompanying Coulomb friction and damping. The main effort went into examining the results obtained from different dynamic models aimed at obtaining the values of the stiffness and damping coefficients. In Part II of this investigation it is shown that serious discrepancies exist between theory and experimental results and a new approach is offered for modeling the two-tiered domain of foil bearings to calculate the dynamic coefficients.