World Academy of Science, Engineering and Technology
International Journal of Aerospace and Mechanical Engineering
Vol:9, No:05, 2015

Nonlinear Mathematical Model of the Rotor Motion in a Thin Hydrodynamic Gap

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Abstract : A nonlinear mathematical model of mutual fluid-structure interaction is presented in the work. The model is applicable to the general shape of sealing gaps. An in compressible fluid and turbulent flow is assumed. The shaft carries a rotational and procession motion, the gap is axially flowed through. The achieved results of the additional mass, damping and stiffness matrices may be used in the solution of the rotor dynamics. The usage of this mathematical model is expected particularly in hydraulic machines. The method of control volumes in the ANSYS Fluent was used for the simulation. The obtained results of the pressure and velocity fields are used in the mathematical model of additional effects.

Keywords : nonlinear mathematical model, CFD modeling, hydrodynamic sealing gap, matrices of mass, stiffness, damping
Conference Title : ICFE 2015 : International Conference on Fluids Engineering
Conference Location : Amsterdam, Netherlands
Conference Dates : May 14-15, 2015