ABSOLUTE AND RELATIVE VIBRATIONS INCONSISTENCIES IN MONITORING AND DIAGNOSTIC OF HIGH POWER TURBOGENERATOR

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ABSTRACT

The paper presents the dynamic stability research results of High Power steam turbines and electric generator rotating system with toothed wheel coupling with nonlinear stiffness. The inconsistencies of journal bearings absolute vibration parameters of the rotating system and HPR rotor's shafts relative vibration parameters have been established. The experiments indicated that in the low frequency defects diagnostics the shafts relative vibration displacements are decisive informative since the bearings absolute vibration velocities of low frequencies are being strongly damped by massive bearing supports, oil film of journal bearings, etc. Theoretical modeling and simulation of rotating system with toothed wheel coupling have been provided by a finite element method**.** Complex model of toothed wheel coupling estimates different stiffness and gaps between teeth and plates. System of equation of rotor motion is solved together with Reynolds equations described in the each hydrodynamic bearings. Absolute journal bearings vibration parameters supply the information erroneously attributed to the rotor. High frequency absolute vibration acceleration, however, make it possible to determine the technical condition of toothed wheel coupling, which is impossible to determine by applying the formats of relative vibration data.

Keywords: Rotor dynamics, hydrodynamic bearings, absolute and relative vibration, toothed wheel coupling stiffness