INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Programme of Study	:	Ph.D.

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SHORT ABSTRACT

Active Magnetic Bearings (AMB) find applications in new generation rotating machines, due to their versatilities. In context of AMB, the literature is rich on two aspects: first - research on control strategy to ensure stability and second - design of forcing to extract information about condition of the rotor shaft. The available literature does not include the problem of crack identification in rotor supported with AMB sustentation. In the present work, model based detection of a relatively small crack in AMB supported shaft is attempted at a steady-state running speed. The system identification involves the estimation of model parameters from forced response measurements. Model of a Jeffcott rotor with a transverse surface crack and unbalance, supported in an AMB is considered. Vibration displacement and AMB control current are generated based on the developed model. Crack and some system parameters are identified using the generated response. The analysis has been extended to offset Jeffcott rotor to address the gyroscopic effects present in such rotors. Dynamic condensation to remove the degrees of freedom that poses practical difficulties of measurement has been implemented. Identification with both the models has been performed and the procedure found robust against signal noise and modelling error. The model has been further extended for finite element based analysis and crack identification.