



38th Annual Meeting
Turbomachinery Research Consortium
May 15-May 17, 2018

Half page Synopsis of Reports for website | Due: Sunday, May 6, 2018

Title of Report: Torsional/Lateral Rotor-dynamics Software with Variable Frequency Drive (VFD) Effects and Motor Eccentric Force Prediction

Summary:

Popular Variable frequency drives (VFDs) and motors may induce torsional vibration problem in rotating machinery trains due to the rich harmonics in motor torques from the PWM switching. To accurately predict the mechanical vibration, it is required to model the entire machinery train with coupled electrical and mechanical fields, including power source, power inverter, VFD controller, motor and mechanical system.

Software capable of comprehensive modeling of both mechanical and electrical subsystems is developed for predicting vibration response and life of VFD motor machinery trains. Steady state forced response is introduced in the year of 2017-2018. Example files are provided accompany with user's guide for better illustration. This update also includes improvements and bug fixes.

Radial and tangential magnetic forces due to eccentricity are predicted using magnetic equivalent circuit (MEC) and finite element method (FEM). MEC motor force software is available for linear induction motor having the capability of determination of radial and tangential force and stiffness. For the FEM software, motor movement modeling is updated to improve numerical stability. Nonlinear motor modeling is introduced. The eccentric permanent magnet synchronous motor force effects on vibration is studied.

Future works are proposed for both VFD software and Motor Force prediction.

