

Study on Dynamical Response of Double-row Self-Aligning Ball Bearing (SABB) considering different radial internal clearance (RIC)

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Abstract: Ball bearings are widely used in variety of rotary mechanisms expecting their maintenance-free operation. One of the main factors influencing bearing life is radial internal clearance (RIC), which can be simply described as relative movement of ball and raceway perpendicular to the bearing axis. Mentioned parameter has a significant impact on dynamic response of applied ball bearing in the system and brings strong nonlinear effects. In the paper nonlinear 3 degrees of freedom (3-DOF) model of double-row self-aligning ball bearing is established. Mentioned type of bearing is very important from operation point of view, because it is used in applications, where strong misalignments are expected coming from assembly of shaft deflection. That is why third z-axis, in shaft's axis is considered. Model input data are based on characteristics of bearing 2309SK. Results of bearing dynamic response are studied for different values of radial internal clearance, one from each different clearance class. For quantitative and qualitative analysis of nonlinear time series a few statistical indicators and FFT are applied, providing information on bearing's behavior regarding RIC's value. Moreover simulation was performed with different rotational velocities of inner ring. Results can be used in the validation process with acceleration response coming from the real bearing node.

Keywords: rolling-element bearing, radial internal clearance, nonlinear dynamics

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References

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