

Computational tapered and cylinder roller bearings

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Abstrak

This monograph presents computational models that describe electro-mechanical characteristics of tapered and cylinder roller bearings in various industrial applications. Applying the Levenberg-Marquardt algorithm to solving strongly nonlinear coupled equation systems, the computational models consisting of many circular slices per rolling element enable computations of the local Hertzian pressures at the elastohydrodynamic (EHD) contact area, the relating oil-film thickness in elastohydrodynamic lubrication (EHL), the limiting voltage of electro-pitting, bearing frictions, and fatigue lifetimes of the bearings for various load spectra. Using the best-known machine-learning method for clustering, the load spectrum is clustered in k cluster means based on the invariant damage number to accelerate the load spectrum. Furthermore, the accelerated load spectrum is used for the testing procedure of the bearings to reduce the testing time and costs as well.