

MODELLING OF BALL BEARING LOADING BY DEM FOR ELECTROMECHANICAL COUPLING

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Rolling bearings are one of the most important and frequently encountered components in domestic and industrial rotating machineries. Statistical studies show that these bearings are considered as critical mechanical components which represent between 40% and 50% of malfunction in rotating machineries. This project represents a straight continuation of the research activities of the LTI and which helped to simulate and understand the electrical response of multi-contact systems [1]. In order to make further progress in the electromechanical modeling, the electrical transfer model is applied to the case of bearing operation [2]. An elastic 2D modeling by discrete elements [3] reproduces the dynamic bearing and the mechanical behaviour. A realistic load is applied to the bearing [4] and determines the electrical measurement. This study proposes an original method of measuring electrical resistance on the bearings to detect malfunctions (defects or unusual load). Each rolling element is a local electrical resistance determined by our model depending on the local loading. Indeed, while many studies have been conducted on monitoring bearing defects by analyzing vibration signals, the use of localized electrical measurements on bearings is a promising approach, not yet exploited. One of our objectives is to investigate the sensitivity of the electrical measurement due to a change in load.

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