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Dynamic analysis of a one-stage gearbox system employing bondgraph approach

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Abstract

In this research dynamic analysis of a one-stage gearbox system was carried out utilizing bondgraph approach. The system under investigation is 8 degrees of freedom gearbox unit. In this system a crack was imposed to one of the spur gears with varying crack size. The proposed method is used to derive the governing equations of motions, which was appropriate for gear fault detection purpose. The status of the tooth deterioration can be evaluated mainly by introducing the reduction in the time-varying gear mesh stiffness. In order to get better insight into the fault status the mesh stiffness effects on the output dynamic response was considered. The governing equations of motion were implemented using block-oriented capabilities of MATLAB software to perform simulation study. As a result, the effects of mesh stiffness and crack size on the displacement of pinion were studied during practical conditions of operation.

Keywords: Bondgraph, Gearbox, Dynamic Model, Crack