



Review

Study of a spur gear dynamic behavior in transient regime

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ARTICLE INFO

Article history:

Received 30 May 2010
 Received in revised form
 28 April 2011
 Accepted 30 April 2011
 Available online 26 May 2011

Keywords:

Acyclism
 Dynamic behavior
 Numerical simulation
 Spur gear
 Transient regime

ABSTRACT

In this paper the dynamic behavior of a single stage spur gear reducer in transient regime is studied. Dynamic response of the single stage spur gear reducer is investigated at different rotating velocities.

First, gear excitation is induced by the motor torque and load variation in addition to the fluctuation of meshing stiffness due to the variation of input rotational speed. Then, the dynamic response is computed using the Newmark method. After that, a parameter study is made on spur gear powered in the first place by an electric motor and in the second place by four strokes four cylinders diesel engine. Dynamic responses come to confirm a significant influence of the transient regime on the dynamic behavior of a gear set, particularly in the case of engine acyclism condition.

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1. Introduction

Gear reducers are frequently used to provide speed and torque conversions from a rotating power source to connected mechanical devices. There are internal and external sources of excitations for the gear set. The internal one is induced by the time varying mesh stiffness. Many authors [1,2] considered this fluctuation as the main source of excitation of the system and at the origin of the observed noise and vibrations. Bartelmus [3,4] and Chaari et al. [5–7] introduced this varying mesh stiffness in a dynamic model of a spur gear system in order to study its response in presence of defects. Amplitude modulations were observed with added frequency components in response spectra. Bartelmus [3,4] and Walha

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