Highlights

A vibration signal model of planetary gearboxes with unequal load sharing among planets

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A vibration signal model of planetary gearboxes with unequal load sharing among planets

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ABSTRACT

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1. Introduction

The Elsevier cas-sc class is based on the standard article class and supports almost all of the functionality of that class. In addition, it features commands and options to format the

2. Signal model

1. Planetary gearboxes have different configuration with similar layouts.
2. In this paper, we only consider the case when ring gear is fixed. (refer to the paper mentioning the sun or carrier as the fixed central part)
3. The vibration sensor is mounted on the stationary ring gear.
4. The vibration mainly origins the the time-varying stiffness gear meshing. When the planet gears engage with the ring gear or sun gear, the number of the involved tooth varies with the relative rotation between gear. Thus, their contact stiffness changes at the time. If the transmission load proximately remain constant, this system is pure parametric excited. (Add a reference about instability)
5. Specially, the torque load transferred from the central components in planetary gearboxes is split into parallel path formed by the planets. Because of the inevitable manufacturing and assembling errors of pinholes or bearings, there are usually differences in the position of pinholes and the shape of planets. The load sharing among planets is non-uniform(collect other reasons from the Sigh's paper).
6. Another common phenomenon in planetary gearboxes is the difference in meshing phases between ring-planets and sun-planets. When this situation coincides with the load sharing inequality, a complex couple-mechanism of time-varying load sharing emerges, rising an extra vibrational source.
7. For an individual planet, the vibration signal model can be written as

$$J \cdot \ddot{\theta}(t) + k(t) \cdot \theta(t) = L(t) \tag{1}$$

References

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