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Experimentation Vibration Damping by Particle Damping in Transmission Gears

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Abstract: *The vibration and noise from gear transmission have great damage on the mechanical equipment and operators. Through inelastic collisions and friction between particles, the energy can be dissipated in gear transmission. A dynamic model of particle dampers in gear transmission was put forward in this project. The vibration from gear engagement is the main source of the noise and vibration of reducers under heavy load and high speed. In order to dissipate the energy as well as suppress the vibration, we introduce the particle damping technology into gear transmission. In this project, the model of the particle dampers is built in the inherent lighting holes of the gear. Then we use the discrete element method to analyze the kinematics and dynamics of the damping particles and determine the relationship between energy dissipation and friction coefficient (surface roughness) of the particles at different rotational speed and load. We come to the conclusion from simulation results that at low rotational speed, smoother particles have better damping effect, while at high speed, rougher particles are better. There is no evident relation between the load and the coefficient of static friction. Finally, the simulation results are verified by experimental results. This conclusion will provide a theoretical basis for engineering practice.*

Keywords: Vibration and Noise, Inelastic Collisions, Gear Transmission, etc.

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