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Analysis and Experimental Research on the Influence of Lubricating Oil on the Transmission Efficiency of New Energy Vehicle Gearbox

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Abstract : New energy vehicle power transmission systems continue to develop in the direction of high torque, high speed, and high efficiency. The cooling and lubrication of the motor and the transmission system are integrated, and new requirements are placed on the lubricants for the transmission system. The effects of traditional lubricants and special lubricants for new energy vehicles on transmission efficiency were studied through experiments and simulation methods. A mathematical model of the transmission efficiency of the lubricating oil in the gearbox was established. The power loss of each part was analyzed according to the working conditions. The relationship between the speed and the characteristics of different lubricating oil products on the power loss of the stirring oil was discussed. The minimum oil film thickness was required for the life of the gearbox. The accuracy of the calculation results was verified by the transmission efficiency test conducted on the two-motor integrated test bench. The results show that the efficiency increases first and then decreases with the increase of the speed and decreases with the increase of the kinematic viscosity of the lubricant. The increase of the kinematic viscosity amplifies the transmission power loss caused by the high speed. New energy vehicle special lubricants have less attenuation of transmission efficiency in the range above mid-speed. The research results provide a theoretical basis and guidance for the evaluation and selection of transmission efficiency of gearbox lubricants for new energy vehicles.

Keywords : new energy vehicles, lubricants, transmission efficiency, kinematic viscosity, test and simulation
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