Faculty of Engineering & Information Technology

Manual Transmission with Electric Torque Assist for Torque Hole Compensation

A thesis submitted for the degree of

Master of Engineering (Research)

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Certificate of Original Authorship

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree except as fully acknowledged within the text.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

Signature of Student:
Date:

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Abstract

The main focus of this research is on the optimization of powertrain of traditional family sedan with manual transmission. The aim of this research is to simulate the transient response transmission torque in a manual transmission with a secondary power resource, electric drive unit, installed on the output shaft of transmission. The current issue that discovered from manual transmission is during the shifting; a torque gap occurs when switching between each gear pair as well as torsional vibration. The torque gap is due to disengagement of clutch when shifting, the torque transferred from engine to transmission gearbox drops to 0, and then after the clutch is engaged, the torque starts increasing and oscillation happens. Such an inconsistency of torque input is the source of power loss and causes decrease in vehicle speed. Torsional vibration is angular vibration of a shaft along its axis of rotation caused by rough torque transmission, and it is considered in this research because it causes jerk or jolt on vehicle body when shifting and it has significant effect on driving comfort or even causes failure if not controlled. Therefore, this research objective is utilizing an electric motor to compensate non-continuous torque transmission. For example, when the clutch is disengaged, motor instead of engine starts operating and produces torque to transmission system. As the results of this alternative, the loss in vehicle's speed is reduced; the torque input to transmission system is more consistent so the torsional deflection of shafts is improved while torsional frequency is not affected, and better driving comfort is achieved.

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