

Analytical Study on Electric Motor Whine Radiated from Hybrid Vehicle Transmission

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The increasing applications of hybrid and electric powertrains have brought additional challenges to NVH development. With the noise produced by traditional combustion engines either intermittent or eliminated entirely, noise from the vehicle transmission becomes more prominent. Customer satisfaction can be negatively impacted, for an example, by whine noise emitted or caused by electric motors.

This paper presents analytical studies using CAE on electric motor whine radiated from HEV transmissions. It starts with outlining the general process used in the analyses, follows by showing an example of CAE to test correlation for the motor whine noise of a HEV transmission to demonstrate the capability of the analysis, then explains the characteristics of the whine noise and sensitivities to certain factors, and ends with some countermeasures studied in an application for lowering the whine noise.