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The development of dynamic model and power assist control logic of hybrid EPS for heavy-duty vehicles

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At present, a hydraulic power steering system is largely used in heavy-duty vehicles. The main problem of this system, however, is that energy loss occurs mostly in straight-line driving situations (few or no steering situation), so a number of studies have researched about an application of electronic power steering system to commercial vehicles. In this paper, we introduce the dynamic model and control strategy of the Hybrid Electro Power Steering (Hybrid EPS) system which combines the Motor Driven Power Steering system (MDPS) and the Electro Hydraulic Power Steering system (EHPS). In order to integrate the control logic of MDPS and EHPS, the input and output variables of these control logics should be same. To harmonize these two control rules, we establish the model of the additional assist-boost map that defines the relationship between the assist-steering torque and the EHPS-pump-rotation speed based on the simulation model established by Matlab/Simulink and TruckSim. Using the additional assist-boost map, the integrated control strategy is designed to determine the total magnitude of the assistant steering torque and to distribute the assistant torque to the MDPS and EHPS. The dynamic model and control logic of Hybrid EPS is consistent with the test data of the conventional heavy-duty vehicle. This approach can be applied to design the optimal control logic for minimizing the energy consumption of Hybrid EPS.

Biography

Ji In Park has completed his BS and MS degrees in Mechanical Engineering from Seoul National University. He is a Research Engineer of Chassis Platform Center of Korea Automotive Technology Institute (KATECH). His research interests are vehicle stability control, BBW system, ADAS system and electronic power steering system.

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