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ELECTRIC POWER ASSIST STEERING SYSTEM BASED ON TORQUE SENSOR

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Abstract

Electric Power Assist Steering - EPAS systems o.er distinct advantages over conventional hydraulic systems in terms of fuel e.ciency, modularity, tenability and environment friendliness. It does so with control mechanisms that reduce the steering e.ort. An EPAS system is designed to use an electric motor for providing variable assist (more assistance at low speeds and vice - versa) that aids in directional control to the driver. This work explores the development of 'assist control' and 'return control' algorithm based on the torque sensor. An EPAS compliant torque sensor considered in this application is discussed. The speed of the vehicle is also monitored and the level of assistance varied accordingly. The assist control algorithm is used to calculate the assist voltage depending on the applied torque and speed of vehicle. This output voltage is then converted to equivalent torque by the motor. The return control algorithm takes the position signals for actual angle turned and calculates the return voltage. This is then used to generate the return torque after driver input goes to zero.

The performance of the algorithm is evaluated through simulation under actual operating conditions. The modeling and simulation of the torque sensor is also presented. The study elaborates the concept of variable assist and validates its importance for reduction of driver's burden in turning the steering wheel and improvement in the steering feel. The conception of EPAS presented here will be of assistance in existing automotive controls and also in the new designs thus serving for a better, safer and healthier driving experience.