

# Study of Design and Implement of the SI Engine Fuel Injection Controller

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## ABSTRACT

The purpose of this study is to build the fuel injection control system dynamic model for SI engine. The object-oriented dynamical simulation programs were integrated to establish the fuel injection system performance evaluation methodology. The amount of fuel injected is controlled by the Fuzzy Logic controller so that the specified air-fuel ratio (A/F) goal can be maintained. This study focused on developing a SI engine fuel injection controller. The related controller from engine were simulated the engine fuel injection quantity and its timing so that engine A/F could be maintained closed to the specified value even under different operating conditions for lowering the engine fuel consumption and emission. With adaptive Fuzzy Logic controller, the fuel injection system control the engine A/F by feedback signals from the exhaust oxygen sensor or state variables in order to give proper correction for fuel injection amount. The SI engine's A/F predicting model and the simulation environment of the controller were cooperated to revise the parameters of the Fuzzy Logic controller for reaching necessary performance. The fuel controller parameters were implemented then into the hardware to realize the fuel injection controller for this specific SI engine. Three different constant-speed, throttle step response were being tested, simulation and the corresponding actual fuel controller hardware outputs were compared. From the experimental data comparison, the A/F were controlled within reasonable range, the fuel injection duration were reduced by 5~15%, while the engine output torque were not varied too much corresponding to the A/F variation. The A/F ratio predicting module for SI Engine established in this research help the related fuel injection controller designer to compare performance effects from the set up parameters chosen and output to the microcontroller chip. The rapid prototype model to chip methodology can save the time and expanse for fuel injection controller research and development.

Keywords : SI Engine Fuel Injection Control ; Fuzzy Logic Control ; Air Fuel Ratio Control

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