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Author Che-Hung Liao
Author's Email Address No Public.
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Abstract
Neuro-Fuzyy approach has quite good fault-tolerant and adaptability, so this study uses this method to set up fault detections of air-Flow sensor and injector of a gasoline engine. It trains the parameters and rules of fuzzy sets then set up the fuzzy system with the parameters and rules to estimate and detect the outputs. In order to find the best fuzzy parameters to satisfy the expected value, use the gradient descent method to update each parameter. In this experiment, got the degree of throttle, fuel injection time, rpm and air-flow signals under normal situation, air-flow sensor breakdown and injector breakdown, then take these signals into neuro-fuzzy approach for fuzzy parameters and rules by the training way. After that, the estimation system of air-flow and diagnosis system of injector fault can be set up. An estimation system of air-flow becomes an repairing system of air-flow with monitoring system designed by LabView. The repairing system of air-flow can detect if the air-flow sensor is getting faults and it also can output the estimating air-flow signal to engine. The diagnosis system of injector fault can detect the single injector or double injector faults. By the experimental results, the estimation system of air-flow can output the air-flow signal to replace the original signal which is produced by air-flow sensor and then the engine state is very close to the normal state at the same time. The diagnosis system of injector fault can diagnose clearly whether singal injector is at fault or double. According to the experimental results, the repairing system of air-flow sensor and the diagnosis system of injector fault which are proposed in this study are feasible and usable and the accuracy is quite well.
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