

Abstract: Advanced thermal management systems can enormously improve the transient response of internal combustion engines (ICEs). It can also reduce the fuel consumption and tailpipe emissions. By regulating the ICE temperature via maintaining desired temperatures of coolant circulating in the engine cooling system, the thermal transient response of ICE can be improved. Advanced automotive thermal management systems feature computer controlled servo actuators to energize a smart valve, water pump, and radiator fan. When all the electrically controlled actuators function harmoniously, desired thermal conditions can be obtained. In this paper, variable structure control (VSC) schemes are proposed for hydraulic actuated automotive cooling systems. Different types of sliding mode controllers along with a fuzzy logic control (FLC) architecture are implemented and tested for transient temperature tracking. Representative numerical simulations are introduced to demonstrate the functionality of the proposed control schemes in accurately tracking a prescribed temperature profiles.