

Temperature control of a cabin in an automobile using thermal modeling and fuzzy controller

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Abstract

This paper covers thermal modeling of a cabin in an automobile to find and control the air temperature by the means of fuzzy controller. Therefore, in first step, the thermal and ventilation loads were estimated then the equations of dry air mass and energy conservation as well as internal components of a cabin were derived and solved simultaneously. The performance of the proposed thermal modeling of a cabin was compared with the experimental hot room test. In the next step, to maintain the thermal comfort of a cabin and controlling the two effective parameters (blower outgoing air velocity and the circulated air percentage), a fuzzy controller was applied. Results showed that when using a fuzzy controller, the temperature control of a cabin took shorter time period and as a result, the time spent for ventilating and cooling the cabin as well as the fuel consumption are reduced.

Keywords: Cabin thermal modeling, Temperature control, Fuzzy controller, Thermal loads