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EXPERIMENTAL ANALYSIS OF FUZZY CONTROLLED ENERGY EFFICIENT DEMAND CONTROLLED VENTILATION ECONOMIZER CYCLE VARIABLE AIR VOLUME AIR CONDITIONING

ABSTRACT

In the quest for energy conservative building design, there is now a great opportunity for a flexible and sophisticated air conditioning system capable of addressing better thermal comfort, indoor air quality, and energy efficiency, that are strongly desired. The variable refrigerant volume air conditioning system provides considerable energy savings, cost effectiveness and reduced space requirements. Applications of intelligent control like fuzzy logic controller, especially adapted to variable air volume air conditioning systems, have drawn more interest in recent years than classical control systems. An experimental analysis was performed to investigate the inherent operational characteristics of the combined variable refrigerant volume and variable air volume air conditioning systems under fixed ventilation, demand controlled ventilation, and combined demand controlled ventilation and economizer cycle techniques for two seasonal conditions. The test results of the variable refrigerant volume and variable air volume air conditioning system for each techniques are presented. The test results infer that the system controlled by fuzzy logic methodology and operated under the CO2 based mechanical ventilation scheme, effectively yields 37% and 56% per day of average energy-saving in summer and winter conditions, respectively. Based on the experimental results, the fuzzy based combined system can be considered to be an alternative energy efficient air conditioning scheme, having significant energy-saving potential compared to the conventional constant air volume air conditioning system.

KEYWORDS

energy conservation, thermal comfort, indoor air quality, fuzzy logic, ventilation, inverter air conditioning

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