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Temperature control using fuzzy controller for variable speed vapor compression refrigerator system

Abstract

Keeping the cold chain vaccine is crucial to a stable immunisation programme; however, faulty processes may occur more frequently than are often thought in developing nations. This paper discusses the quick and accurate control process for designing fuzzy controllers for variable speed vapor compression refrigerator system. The suggested controller is based on the fuzzy logic intended to improve performance while keeping the cooler's constant internal temperature and increasing the refrigerator efficiency. Despite the external changes such as the outside temperature change or the volume change in the refrigerator vaccine, the fuzzy logic controller is utilised to maintain the interior temperature. However, a variable speed compressor (VSC) must be used to control the thermophysical characteristics, which dramatically alter the temperature with a small pressure change. In this case, fuzzy rules of the sort developed by Mamdani are used to build up the system. The programming platforms utilised to implement the model include MATLAB, SIMULINK, and Fuzzy Logic Toolbox (FLT). The efficiency of fuzzy logic controller design membership will be compared to ensure that the refrigerator temperature is more accurate and until it achieves the best performance, maintains a temperature of 5°C, and adapts to its surroundings. From the research done, the membership 2 with load shows the near accurate temperature of 5°C with steady-state error ±1.97°C.

Keywords

Control effort; Fuzzy controller; Membership; Temperature control; Variable speed compressor