

Study on the Fuzzy Control of CO₂ Heat Pump System

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In the air-conditioning and refrigeration industry, several efforts have been made to protect the environment. One of them is to use carbon dioxide as an alternative refrigerant; however, several researches have shown that the transcritical heat pump system using CO₂ has relatively lower efficiency resulting in a degraded steady-state system performance. In this study, fuzzy control of the CO₂ heat pump system was applied to modulate the heat capacity and improve the system performance. The heat capacity is controlled by the change of the inverter frequency and the system performance is controlled by the superheat regulation. The capacity modulation and superheat regulation have been performed independently, based on multi-input multi-output (MIMO) control logic. Performance improvement for gas cooler water inlet of temperature 30°C and evaporator water inlet temperature 27°C was obtained.