

Fuzzy Logic Controller For Low Temperature Application

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We describe the development of a new computer-based temperature controller using fuzzy logic algorithms. Fuzzy logic rules and reasoning are applied in-situ for determining PID controller parameters based on an error signal and its first derivative. This controller design will be used to stabilize several isothermal stages of a cryostat for studying thermodynamic parameters near the ^3He liquid-gas critical point. Simulations of temperature control near the ^3He critical point ($T_c \approx 3.3$ K) show that faster settling, smaller overshoot, and easier control can be achieved using the fuzzy logic temperature controller in comparison with the traditional PID controller. [Work supported by NASA].

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