

Dr. Vicky Watkar: Fuzzy Logic in Temperature Control Systems: Adaptive and Intelligent Solutions

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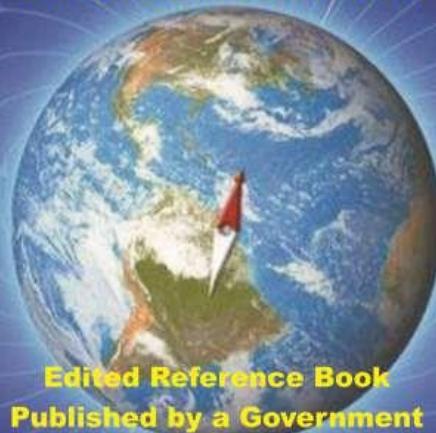


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Fuzzy Logic in Temperature Control Systems: Adaptive and Intelligent Solutions

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Abstract

This book chapter explores the implementation of fuzzy logic in temperature control systems, presenting a detailed analysis of its adaptive and intelligent attributes. The chapter introduces the core principles of fuzzy logic, underscoring its significance in delivering versatile and effective control solutions for temperature dynamics. Through real-world applications and case studies, the chapter illustrates the prowess of fuzzy logic in enhancing adaptability, positioning it as an indispensable tool in temperature control systems.

Keywords: Fuzzy Logic, Temperature Regulation, Adaptive Control, Linguistic Variables, Fuzzy Inference System, Membership Functions, Rules, Intelligent Control.

Introduction

Traditional temperature control methods have evolved over the years and often rely on conventional engineering approaches to maintain a desired temperature within a system. Here's a brief overview of some traditional temperature control methods:

On/Off Control: Simple on/off switching based on the deviation of the current temperature (T) from the setpoint (SP).

Proportional Control: Adjusts heating or cooling intensity proportionally to the temperature error ($e = SP - T$), We Can Mathematically express $\mu(t) = K_p \cdot e(t)$

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