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Building automation system with adaptive comfort in mixed mode buildings

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Highlights

- Application Methodology of adaptive control algorithms in buildings.
- Implementation in HVAC system of the results of a field study has been carried out in buildings in Seville.
- Software implementation for Building Automation System to manage the thermal comfort.
- Operating air conditioning in a mixed mode strategy has significant energy benefits.

Although there are many field studies to achieve a model of comfort in free running buildings, fewer studies focus on mixed-mode buildings. Moreover, there are even fewer examples of implementing such algorithms into a building automation system for testing its real validity. In this study, a methodology for implementing and validating an Adaptive Control Algorithm in mixed mode buildings is proposed. In particular, the paper shows the implantation and application of an experimental adaptive control algorithm in the current installation of an office building and without additional costs or specific hardware. The experiment seeks to find a relationship between comfort of their occupants and with energy efficiency. The implementation into the building's system shows the real applicability and the effectiveness of the adaptive model to hybrid buildings, highlighting that the methodology proposed could be applied in another type of building. The results show that it is possible to improve the energy efficiency, while maintaining the comfort of the users using only the tools yet available in the Building Automation System of the buildings and without additional systems, no extra costs and minimum intervention in its control system.

Keywords: thermal comfort; adaptive comfort; offices; air-conditioning unit; indoor comfort temperature; building automation system

1. Introduction

The recent interest in the field of thermal comfort follows an exponential trend with a considerable increase in publications in the last ten years (Rupp, Vásquez, & Lamberts, 2015), where

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