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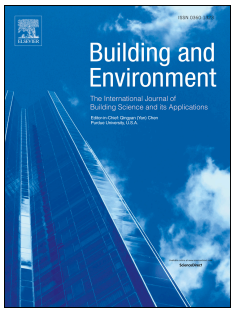

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An efficient modelling for temperature control of residential buildings

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Abstract

In this paper we propose a method for modelling the temperature of the rooms of a (retrofitted) residential building for control purposes. By assuming that only the temperature in the rooms and the solar radiation can be measured, the approach consists in writing the first-principles thermodynamics equations of the system and then, based on them, in developing a (black-box) ARMAX model. The model parameters are estimated by initially employing a standard method with a pseudo random set-point signal and then they are adapted by using a self-calibration method when the performance deteriorates. The selection of the user defined parameters in the overall procedure is thoroughly discussed by means of simulation results and experimental results are also shown in order to highlight the practical effectiveness of the proposed methodology.

Keywords: modelling, temperature control, self-calibration, computational efficiency.