特別研究報告

温室における温湿度予測モデルの研究

Multistep Ahead Predictive Model of Greenhouse Climate

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Abstract

This research presents a predictive modeling of greenhouse climate by integration of recursive ARX (auto regressive with external Inputs) and NARX (nonlinear autoregressive network with exogenous inputs) models. In this work, the dynamic model is composed of internal temperature and humidity as output variables, and external temperature, humidity, solar radiation, ventilation, time influence and whether condition as input variables. We run recursive ARX identification based on multistep ahead inputs and outputs data predicted by NARX model. We compare measured and predicted data, and evaluate the performance of this method. This paper presents a prediction technique of Internal temperature and humidity. Nonlinear autoregressive network with exogenous inputs models is utilized in order to predict an external temperature and humidity and solar radiation. The computation data consist of external temperature, humidity and solar radiation as the uncontrollable input. The controllable input is considered in order to completely identification of the greenhouse model using the ventilation variable. Auto regressive with external Inputs is applied in order to identify a dynamic model of greenhouse system by online -parameter estimation. In addition, the Internal temperature and humidity of greenhouse are simulated and predicted using the enhanced predicted data form NARX to recursive ARX. In conclusion, the simulation results from the estimated to predicted data reveals that the proposed technique is able to identify the greenhouse climate model in future stage and can predict internal greenhouse conditions