基于时序分析法的温室温度预测模型　Forecast Model of Greenhouse Temperature Based on Time Series Method

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关键词：　温室 温度 时间序列 预测 模型

摘　要：　针对现有温室环境控制系统无法对下一时段温室温度进行精确预测的问题，提出采用时序分析法建立温度预测模型的方法。以圆拱型连栋薄膜温室2001年6月6日~2002年9月16日间的温度为例，首先对温度序列进行一阶年度差分处理来实现序列的平稳化；然后根据一阶年度差分序列自相关系数和偏相关系数的特点，提出采用ARMA（p，q）模型来拟合温室温度；最后根据方差估计和误差平方和最小的原则，确定了一个ARMA（4，4）模型作为夏季温室温度的1步预测模型。试验结果表明，模型预测值与实测值相比，最大绝对误差为0.8℃、最大相对误差为3.2%，平均绝对误差为0.2℃、平均相对误差为1.1%。Aiming at the existed problem that greenhouse environment control systems can not accurately predict the next stage air temperature inside the greenhouse and provide the basis for the control system to control the temperature optimally, a temperature forecast model based on time series method was developed. The temperature series collected from Jun. 6, 2001 to Sept. 16, 2002 in a hemispherical-roof greenhouse was studied. Firstly, the greenhouse temperature series was annual and first-order differenced in order to get a stationary greenhouse temperature series. Secondly, according to the characteristics of the autocorrelation coefficient and partial correlation coefficient of the first order annual difference series of greenhouse temperature, the ARMA（p, q）model was put forward to fit the greenhouse temperature. Finally, according to the minimum principles of variance estimate and the sum of squares of errors, an ARMA (4,4) model was determined as the 1-step forecast model of greenhouse temperature in summer. The test results show that the most absolute error and relative error of the forecast temperature of the　1-step　forecast model are 0.8℃ and 3.2% respectively, and that the average absolute error and relative error are 0.2℃ and 1.1% respectively.

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