中南大学学报 自然科学版 英文版

教育部 主管
中南大学 主办

论文摘要

中南大学学报(自然科学版)

ZHONGNAN DAXUE XUEBAO(ZIRAN KEXUE BAN)

Vol.41 No.1 Feb.2010

[PDF全文下载] [全文在线阅读]

文章编号：1672-7207(2010)01-0357-07

区域供冷系统逐时冷负荷的分析及数值预测

蒋小强[1，2]，龙惟定[3]，李敏[2]

(1．同济大学 机械工程学院，上海，200092；
2．广东海洋大学 工程学院，广东 湛江，524025；
3．同济大学 中德工程学院，上海，200092)

摘 要：为了正确选择区域供冷系统设计负荷并优化其主机运行策略，对某区域供冷系统的逐时实际冷负荷变化规律及数值预测进行研究。通过对该区域供冷系统冷冻水供回水温度及流量进行实测，得到并分析实际逐时冷负荷；通过增加输入层数据，建立改进人工神经网络负荷预测模型并对预测值及其误差进行分析。研究结果表明：区域供冷系统在各负荷区间运行时间分布较均匀；在实测期间，系统在高负荷区间的运行时间所占比例为17.5%，最低负荷区间的运行时间所占比例为13.5%，其他负荷区间运行时间比例为15%~20%，这与单区域供冷系统负荷越大则运行时间越短的特点完全不同；并且区域供冷系统连续24 h工作，实测日最小运行负荷仅为当日最大实际负荷的11.8%，逐时负荷变化范围大，这说明区域供冷系统更应注意机组容量选型和运行策略优化；由经改进人工神经网络算法得出的负荷预测值与实际值较吻合，其相对误差受用冷区域功能与特点的影响。

关键字：区域供冷系统；冷负荷；人工神经网络；预测

Hourly cooling load analysis and prediction in a district cooling system

JIANG Xiao-qiang[1, 2], LONG Wei-ding[3], LI Min[2]

（1. School of Machine Engineering, Tongji University, Shanghai 200092, China;
2. School of Engineering, Guangdong Ocean University, Zhanjiang 524025, China;
3. Sino-German School of Applied Sciences, Tongji University, Shanghai 200092, China）

Abstract: To determine district cooling system(DCS) design load and optimize their chillers' operation strategy, the variation law and prediction of hourly cooling load in a DCS were studied. By measuring the temperature and flow rate of the return and supplying chilled water in the DCS, actual hourly cooling load was obtained and analyzed; moreover by adding input data, an improved neural network model (INNM) for predicting cooling load value was built, and the relative error of prediction value was analyzed. The results show that the running time is almost even whether under high load intervals or under low ones. The proportion of running time in the highest load intervals is 17.5%, while that in the lowest load interval is 13.5%, and the proportion in other intervals is among 15%-20%. The variation law in the DCS is very different from the one in the single region air-conditioning: The character of the latter is that the larger the load, the shorter the running time. Moreover, the DCS works for 24 h, the minimum load is only 11.8% of the maximum; that is, the variation range of the cooling load is great, which shows the importance of choosing the chiller capacity and optimizing the operation strategy. And the predicted cooling loads obtained from the INNM can be consistent with the actual values

well, and its relative error is affected by the function and the character of the DCS.

Key words:district cooling; cooling load; neural network; prediction