中国电机工程学报 2007 27 (20): 7-11 ISSN: 0258-8013 CN: 11-2107/TM

发电

汽轮发电机组轴向胀差在线监测与变温度速率控制系统

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收稿日期 2006-9-13 修回日期 网络版发布日期 2007-10-15 接受日期

摘要

研究了汽轮机轴向胀差的实时在线计算以及通过变温度速率控制胀差的方法。在二维圆筒壁非稳态导热的基础上，得到了圆筒壁内蒸汽沿轴向线性分布，随时间非线性变化的温度场迭代计算公式，并与有限元计算结果作了对比，结果表明所得模型计算精度高、计算速度快。将结构复杂的汽缸分解成可计算的有限子结构，根据子结构的温度场求得汽缸的膨胀特征温度，进而求解其膨胀量。对理论模型进行了有限元验证，计算结果与有限元结果相比误差较小，满足工程计算的需要。给出了胀差裕度的定义，根据胀差裕度值来控制蒸汽温度变化速率，并开发了轴向胀差在线监测与变温度速率控制系统(DEOM-ACTC)。

关键词 汽轮发电机组 轴向胀差 在线监测 变温度速率

分类号 TK28

Study on Axial Differential Expansion On-line Monitor and Automatic Changing Temperature-speed Control System of Turbine-generator UnitStudy on Axial Differential Expansion On-line Monitor and Automatic Changing Temperature-speed Control System of Turbine

Abstract

The methods of calculating turbine axial differential expansion on-line and controlling axial differential expansion by c changing steam temperature increment were investigated. An iterative temperature field model of cylinder, in which the non-linear steam temperature distributed along axial direction, was got based on two-dimensional transient heat conduction differential equation. Analytical simulation demonstrates not only a rapid solution convergence but a minor error. The complex cylinder was divided into several substructures, and the cylinder casing expansion was calculated by expansion reference temperature (ERT). A good coincidence comparing the result calculated according to the theoretical model presented with finite element calculation can be observed. Axial differential expansion margin was defined, which controlled the steam temperature changing rate. The system of differential expansion on-line monitor and automatic changing temperature-speed control was developed.

Key words turbine-generator set axial differential expansion on-line monitor changing temperature speed

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