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遵循IEC 61850实现变电站自动化系统时间同步的频率调节算法设计

易 娜1，贺 鹏1，易亚文2，赵 斌1

1．三峡大学 电气信息学院，湖北省 宜昌市 443002；2．中国长江电力股份有限公司 三峡水力发电厂，湖北省 宜昌市443133

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摘要
根据IEC 61850标准的要求，将网络对时方式应用到变电站自动化系统中。由于时钟偏差本质上是时钟本身与标准时间源之间频率的偏差造成的，作者以统计学中的艾伦方差分析法为基础，提出一套由软件实现的频率相位混合调节时钟同步算法。具体应用表明，该算法运行24 h的平均偏差为3.08 ms，最大偏差为15 ms，满足变电站层时间同步的精度要求(小于100 ms)，同时可以有效减少对时间服务器的访问频率，并使时钟曲线更加平滑。

关键词 IEC 61850；变电站自动化系统；时间同步；频率调节；网络时间协议(NTP)

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Design of Frequency Adjustment Algorithm for Time Synchronization of Substation Automation System According to IEC 61850 Standard

YI Na1，HE Peng1，YI Ya-wen2，ZHAO Bin1

1．College of Electrical Engineering and Information Technology，China Three Gorges University，Yichang 443002，Hubei Province，China；2．Three Gorges Hydropower Plant，China Yangtze Power Co.，Ltd.，Yichang 443133，Hubei Province，China

Abstract
In the light of the requirement of IEC 61850 standard, the network time protocol (NTP) is applied to substation automation system (SAS). According to the feature that time offset is caused in essence by the frequency deviation between the clock itself and standard time source, on the basis of variance analysis method in statistics a software implemented clock synchronization algorithm in which the hybrid adjustment of frequency and phase is adopted is proposed. Concrete application shows that after 24 hour operation of the proposed algorithm the average deviation is 3.08 ms and the maximum deviation is 15 ms, so the accuracy requirement of time synchronization for substation level (less than 100 ms) can be satisfied, at the same time, the access frequency of time server can be effectively reduced, and the clock curve becomes more smooth.

Key words IEC 61850；substation automation system (SAS)；time synchronization；frequency adjustment；network time protocol (NTP)

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通讯作者

作者个人主页 易 娜1;贺 鹏1;易亚文2;赵 斌1