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自动化

基于GPS实现电力系统高精度同步时钟

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摘要：

根据全球定位系统(global positioning system，GPS)秒时钟的随机误差和高精度晶振的累计误差互补的特点，利用数字锁相原理，通过测量GPS秒时钟与晶振秒时钟间的相位差来控制晶振秒时钟的分频系数，实时消除晶振秒时钟的累计误差，从而产生高精度秒时钟，并利用复杂可编程逻辑器件(complex programmable logic device，CPLD)设计了高精度同步时钟系统。GPS信号接收正常时，CPLD根据数字锁相原理产生高精度同步时钟；GPS信号接收不正常时，CPU调取存储的分频系数控制CPLD产生高精度时钟。仿真分析和实验结果表明该时钟系统具有很高的时间准确度和稳定性。

关键词：

Realization of High Accuracy Synchronous Clock for Power System Based on GPS

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Abstract:

In view of the complementarities between the random error of one pulse per second (1PPS) in global positioning system (GPS) and accumulated error of high-precision crystal oscillator, based on the principle of digital phase-locked loop (DPLL) it is proposed to control frequency dividing coefficient of the crystal oscillator second clock by measuring the phase difference between 1PPS of GPS and the crystal oscillator second clock to eliminate the accumulated error of crystal oscillator in real-time mode, thus high-precision 1PPS can be attained and a high accuracy second clock system is designed by use of complex programmable logic device (CPLD). When the reception of GPS is in normal state, a high accuracy second clock can be come into being by CPLD according to the principle of DPLL; when the reception of GPS is in abnormal state, the stored frequency dividing coefficient can be called by CPU to control CPLD to generate high-precision clock signal. Both simulation analysis and experimental results show that the proposed clock system possesses high time accuracy and stability.

Keywords:

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