■ 论文摘要

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一类复杂机电传动系统的耦合建模方法

贺建军[1]，喻寿益[1]，钟　掘[2]

(1. 中南大学信息科学与工程学院,湖南长沙　410083;
2. 中南大学机电工程学院,湖南长沙　410083)

摘　要：针对一类由多个机电传动子系统组成的复杂机电系统提出了一种耦合建模方法,其步骤为:建立各子系统的数学模型;通过传动对象之间的耦合参数和物理量将各个子系统耦合起来,建立整个机电传动系统的数学模型;根据时间尺度原则,在保留原来系统模型的主导特征值和重要状态变量的前提下,对模型进行降阶处理,得到系统可实用的数学模型.此外,通过仿真实验,检验了所建模型的正确性和建模方法的可行性.实验结果表明:这种建模方法原理简单,易于实现,所建模型可用于系统特性分析、参数优化以及最优控制等.

关键字：机电系统; 耦合建模; 轧机

A coupling modeling method for a class of complicated electromechanical driving system

HE Jian-jun[1], YUShou-yi[1], ZHONG Jue[2]

（1.College of Information Science and Engineering, Central South University, Changsha 410083, China;
2.College of Mechanical and Electrical Engineering, Central South University, Changsha 410083, China）

Abstract: For a class of complicated electromechanical driving systems consisting of multiple subsystems,this paper puts forward a coupling modeling method. The mathematical model of each electrical driving subsystem is constructed by means of modeling method of structural principle or parameter identification. Secondly, the overall coupling model is established according to coupling variables and interacting parameters between electromechanical driving subsystems; Finally, the overall model is simplified according to time-scale principle which can retain main eigenvalues and significant state variables, and a practical model is obtained.The process and steps of modeling method are expounded by means of an example in this paper.This paper also verifies correctness of the model and feasibility of the modeling method in simulation experiment.The principle of the modeling method is simple,and it can easily be realized. The model constructed by
this method can be applied in analysis of characteristics, and optimization of parameters ,optimum control of system.

Key words:electromechanical system; coupling modeling method; rolling mill