



## 基于PSO算法的直接驱动阀用音圈电机优化设计

吴帅, 王大彧, 邢秋君, 焦宗夏\*

北京航空航天大学 自动化科学与电气工程学院, 北京 100191

## Voice coil motor for direct drive valve optimization design by means of particle swarm optimization

Wu Shuai, Wang Dayu, Xing Qiujun, Jiao Zongxia\*

School of Automation Science and Electrical Engineering, Beijing University of Aeronautics and Astronautics, Beijing 100191, China

摘要

参考文献

相关文章

Download: [PDF \(1KB\)](#) [HTML 1KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

**摘要** 音圈电机(VCM, Voice Coil Motor)直接驱动伺服阀(DDV, Direct Drive Valve)采用VCM直接驱动滑阀阀芯, VCM的性能对DDV整体性能起决定性作用。由于VCM的几何设计参数对性能提升存在相互矛盾, 需要在允许的参数空间内寻找一组最优的参数, 往往需要设计者试凑多次。在介绍VCM原理和结构的基础上, 分析了各设计参数对性能的影响。定义了针对DDV应用需求的VCM优化目标函数, 应用变惯性权值和带收敛因子的改进粒子群优化(PSO, Particle Swarm Optimization)算法在设计约束的多维参数空间内进行VCM优化, 得到满足设计约束的最优设计参数, 表明PSO算法在类似应用中具有较强工程应用价值。

**关键词:** 粒子群优化 音圈电机 设计目标函数

**Abstract:** Voice coil motor (VCM) direct drive valve (DDV) is a type servo valve which utilize the VCM drive spool directly and its dynamic characteristic is depends on the performance of VCM. Unfortunately, some of design parameters of VCM are contradictory when ambition the best performance, it always need to trial-and-error many times by designer. Based on the introduction of principle and structure of VCM, the effect of each design parameters for the performance was analyzed, and the parameters need to be optimized synthesized was pointed out. The optimization objective function was defined under the design constraint, and the improved particle swarm optimization (PSO) methods which use inertia weight and constriction coefficient were applied for search the optimum parameters in multidimensional parameters space. The best parameters were obtained under design constraint. It also improve that PSO is an efficient way to solution these questions.

**Keywords:** particle swarm optimization voice coil motor design objective function

Received 2010-04-02;

Fund:

国家科技支撑计划资助项目(2006BAF01B10-01)

About author: 吴帅(1980-),男,湖南醴陵人,博士生,wushuai\_vip@gmail.com.

### 引用本文:

吴帅, 王大彧, 邢秋君, 焦宗夏. 基于PSO算法的直接驱动阀用音圈电机优化设计[J] 北京航空航天大学学报, 2011, V37(8): 997-1000

Wu Shuai, Wang Dayu, Xing Qiujun, Jiao Zongxia. Voice coil motor for direct drive valve optimization design by means of particle swarm optimization [J] JOURNAL OF BEIJING UNIVERSITY OF AERONAUTICS AND A, 2011, V37(8): 997-1000

### 链接本文:

<http://bhxb.buaa.edu.cn//CN/> 或 <http://bhxb.buaa.edu.cn//CN/Y2011/V37/I8/997>

### Service

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [Email Alert](#)
- ▶ [RSS](#)

### 作者相关文章