

动力机械与工程

液力变矩器内三维非定常动静干涉流动计算

韩克非, 吴光强

同济大学汽车学院

摘要:

为研究液力变矩器内泵轮、导轮和涡轮间动静干涉引起的三维非定常流动特性, 利用滑移网格技术和RNG k-e湍流模型计算液力变矩器内湍流流动, 得到泵轮全流道内流体压力的主要特征。仿真结果表明: 泵轮全流道内流体压力脉动明显; 在涡轮转速不变的情况下, 压力脉动峰值与半径成正比; 在相同半径处, 压力脉动峰值与涡轮转速成反比。此外, 由压力脉动值的频谱分析结果可知: 随涡轮转速或监测点半径变化, 泵轮全流道内各监测点压力脉动的频率成分基本一致, 但各影响频率成分所占的比例不同。

关键词: 液力变矩器 叶轮 动静干涉 滑移网格 非定常流动

Calculation of Three Dimension Unsteady Rotor and Stator Interaction Flow in Torque Converter

HAN Kefei, WU Guangqiang

Automotive School, Tongji University

Abstract:

To study the three dimensions unsteady flow characteristics caused by interactions among pump, stator and turbine in torque converter, the turbulent flow of torque converter was simulated based on sliding mesh technique and RNG k-e turbulence model. Then, the main features of fluid pressure in the whole flow passage of pump were observed. The simulation results show that the fluid pressures present significant fluctuations in the whole flow passage of pump. The pressure fluctuation peak values are directly proportional to radius in the invariant turbine speed and inversely proportional to turbine speed in the same radius. Furthermore, the results of spectrum analysis to pressure fluctuations obtain that with the changes of turbine speeds or radii of monitoring points, the frequency components of pressure fluctuations of monitoring points in the whole flow passage of pump are basically identical; however, the influence frequency components are different from each other in proportion.

Keywords: torque converter impeller rotor-stator interaction sliding mesh unsteady flow

收稿日期 2010-08-05 修回日期 2010-09-26 网络版发布日期 2011-01-27

DOI:

基金项目:

国家863高技术基金项目(2007AA04Z132); 上海市科委资助项目(08DZ0500900)。

通讯作者: 韩克非

作者简介:

作者Email: hkf\_041@163.com

参考文献:

本刊中的类似文章

1. 高学林 袁新. 叶轮机械全三维粘性气动优化设计系统[J]. 中国电机工程学报, 2006,26(4): 88-92
2. 王立清 盖秉政. 汽轮机叶轮T型叶根槽半椭圆表面裂纹应力强度因子数值研究[J]. 中国电机工程学报, 2008,28(32): 76-81
3. 谢永慧 蓝吉兵 樊涛. 透平级三维粘性非定常流动及气流激振力研究[J]. 中国电机工程学报, 2008,28(5): 78-84

扩展功能

本文信息

- ▶ Supporting info
- ▶ PDF(615KB)
- ▶ [HTML全文]
- ▶ 参考文献[PDF]
- ▶ 参考文献

服务与反馈

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ 引用本文
- ▶ Email Alert
- ▶ 文章反馈
- ▶ 浏览反馈信息

本文关键词相关文章

- ▶ 液力变矩器
- ▶ 叶轮
- ▶ 动静干涉
- ▶ 滑移网格
- ▶ 非定常流动

本文作者相关文章

- ▶ 吴光强
- ▶ 韩克非

PubMed

- ▶ Article by Wu,G.J
- ▶ Article by Han,K.F

4. 姜华 宫武旗 席光 张炜.导叶预旋对扩压器进口非定常流动的影响[J]. 中国电机工程学报, 2010,30(23): 90-95
  5. 韩克非 吴光强 王立军.基于正交设计的泵轮叶栅关键参数对液力变矩器的性能影响优化分析[J]. 中国电机工程学报, 2010,30(35): 65-70
-