

刘在伦,董 玮,张 楠,吴 佼.离心泵平衡腔液体压力的计算与验证[J].农业工程学报,2013,29(20):54-59

离心泵平衡腔液体压力的计算与验证

Calculation and validation of fluid pressure of balance cavity in centrifugal pump

投稿时间: 2013-01-28 最后修改时间: 2013-09-21

中文关键词: [离心泵](#),[模型](#),[计算](#),[叶轮](#),[平衡腔压力](#),[无因次曲线](#)

英文关键词: [centrifugal pumps](#) [models](#) [calculations](#) [impeller](#) [fluid pressure of the balance cavity](#) [dimensionless curves](#)

基金项目:国家自然科学基金资助项目(51269010);浙江省自然科学基金资助项目(Y12E90005)

作者 单位

[刘在伦](#) [1. 兰州理工大学能源与动力工程学院, 兰州 730050. 兰州理工大学温州泵阀工程研究院, 温州 325105](#)

[董 玮](#) [1. 兰州理工大学能源与动力工程学院, 兰州 730050](#)

[张 楠](#) [1. 兰州理工大学能源与动力工程学院, 兰州 730050](#)

[吴 佼](#) [1. 兰州理工大学能源与动力工程学院, 兰州 730050](#)

摘要点击次数: **172**

全文下载次数: **91**

中文摘要:

针对开平衡孔双密封环叶轮离心泵的平衡腔液体压力计算问题,基于液体通过叶轮平衡孔和后密封环间隙的泄漏量相等,引入了压力系数和比面积2个无因特征参数,导出了平衡腔液体压力计算模型,其关系曲线为无因次曲线,并给出了待定系数a、b的计算方法。在3BA-6泵上,取与计算相同的叶轮平衡孔直径进行了试验验证。表明,在泵设计工况下平衡腔液体压力的试验与理论无因次曲线较为一致,验证了平衡腔液体压力计算模型的正确性与可行性。该研究可为开平衡孔双密封环叶轮离心轴向力计算提供基础理论。

英文摘要:

Abstract: In the design of a centrifugal pump, the double seal ring impeller with the balance hole is the main methods of balancing axial thrust. The cover force produced by the pressure difference in the balance cavity region was the main part of axial thrust. A study on the calculation method of fluid pressure of the balance cavity in the impeller has important significance for the accurate calculation of the axial thrust. In order to solve the fluid pressure calculation of the balance cavity in the impeller, the two dimensionless characteristic parameters about specific area and pressure coefficient were introduced. Under the condition of the fluid leakage in the balance hole and the back seal ring clearance at the impeller equal, a calculation model of fluid pressure in the balance cavity was derived. The dimensionless curve of the calculation model was, and an undetermined coefficient a and b in calculation method was introduced. For the 3BA-6 pump, under the condition of the different diameter of the balance hole, the theoretical dimensionless curves of the fluid pressure in the balance cavity at design point were obtained. To illustrate the problem, under the condition of the same pump structure, a verification experiment by taking the same diameter of balance hole as the calculation was conducted. The fluid pressure of the back seal ring outlet and impeller inlet at the design point was measured, so the experiment dimensionless curve was obtained. Research showed that, the experiment dimensionless curve and the theoretical dimensionless curve on the fluid pressure in the balance cavity at the design point were coincident, and the test curve above the theoretical curve, but when 0.5, was maximum between the experiment dimensionless curve and the theoretical dimensionless curve, maximum absolute error was 0.049. The result proved that the calculation model of fluid pressure in the balance cavity was correct and feasible. For a centrifugal pump of double seal ring impeller with a balance hole, the specific expressions on the calculation model of fluid pressure in the balance cavity by calculating was obtained. Furthermore, the pressure difference of the two sides of the impeller back cover and the cover force produced by the pressure difference in balance cavity region can be calculated.

[查看全文](#) [下载PDF阅读器](#)

关闭