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新型双向硬密封旋球阀多学科设计优化

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摘 要：为确保新型双向硬密封旋球阀整体性能提高，以新型双向硬密封旋球阀密封性能、质量、抗冲击性能以及流阻系数为目标函数建立多学科设计优化模型，并充分考虑各学科之间的耦合效应，采用自适应混沌优化算法对多学科设计优化模型进行求解。研究结果表明：新型双向硬密封旋球阀渗漏率η减少60.0%，质量M减少2.15%，位移变形Δε减少37.6%，流阻系数Δξ减少37.5%；新型双向硬密封旋球阀的流量调节性能优于优化前的流量调节性能。

关键字：新型双向硬密封旋球阀；多学科优化设计；混沌优化算法；流量；调节

Multidisciplinary optimization design on new type rotating ball valve with double direction metal sealing

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Abstract: In order to guarantee the improvement of the whole performance for new type rotating ball valve with double direction metal sealing, a multidisciplinary design optimization (MDO) model was established based on objective function such as sealing preformance, mass, resistance performance for shock and flow resistance coefficient. Based on coupled effect between each subject, a new type rotating ball valve was designed by using MDO based on self-adaptive chaotic optimization algorithm. The results show that for new type rotation ball valve with double direction metal sealing, leakage ratio reduces 60.0%, mass reduces 2.15%, resistance performance for shock reduces 37.6%, and the flow resistance coefficient reduces 37.6%. The flow adjustment capacity is also improved after optimized.

Key words:new type rotating ball valve with double direction metal sealing; multidisciplinary optimization design; self-adaptive chaotic optimization algorithm; flow; adjustment

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