变频泵控马达调速系统变结构鲁棒设计 Variable Structure Robust Design for Variable Frequency Pump-control-motor Speed Governing System

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关键词： 泵控马达 扰动观测器 滑模变结构控制 鲁棒性

摘 要： 针对变频泵控马达调速系统负载转矩的未知时变特性，设计了一种扰动观测器对负载转矩扰动进行观测及补偿。设计了滑模变结构鲁棒控制器，并进行鲁棒性证明，利用其对扰动不敏感特性来抑制各种内外干扰的影响，以提高系统的鲁棒性和控制性能。仿真试验表明，所设计的控制器对负载扰动和参数摄动的鲁棒性较好，具有较高的速度跟踪精度和较好的动态性能，可满足泵控马达调速系统的控制要求。 A disturbance observer was proposed to estimate and to compensate the load disturbance of the variable frequency pump-control-motor speed governing system. In order to improve the robustness and performance of the system, a sliding mode variable structure controller was designed to weaken the impact on the system of the disturbance. The proof on robustness of the system was conducted. Simulation results verified that the designed controller shows good robustness to the load disturbance and system parameters uncertainty, which effectively improves the precision of speed control and meets the requirements of the pump-control-motor speed governing system.

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