2013 International Journal of Automation and Smart Technology

Multivariable Robust Control Design for an Active Gait Trainer

Chung-Huang Yu, Fu-Cheng Wang and Chia-Hui Chen

Abstract

This paper proposes multivariable robust control for an active gait trainer, which uses linkage mechanisms and electrical motors to produce preferred gait traces for people with walking disabilities. We first obtain multivariable transfer functions of the system by identification techniques, and then select nominal plants for control design based on the systems' gap metrics. To guarantee stability and performance for the system which has variations and disturbances during operation, we design multivariable robust controllers to synchronously control the motors to produce preferred gaits. The designed controllers are applied on the gait trainer system for experimental verification. The results demonstrate the effectiveness of the system.