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Design and Implementation of Robust Controllers for a Gait Trainer

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Abstract

This paper applies robust algorithms to control an active gait trainer for children with walking disabilities. Compared with traditional rehabilitation procedures, in which two or three trainers are required to assist the patient, a motor-driven mechanism was constructed to improve the efficiency of the procedures. First, a six-bar mechanism was designed and constructed to mimic the trajectory of children's ankles in walking. Second, system identification techniques were applied to obtain system transfer functions at different operating points by experiments. Third, robust control algorithms were used to design H_∞ robust controllers for the system. Finally, the designed controllers were implemented to verify experimentally the system performance. From the results, the proposed robust control strategies are shown to be effective.