Application of Fourier Series Based Learning Control on Mechatronic Systems

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Abstract : A Fourier series based learning control (FSBLC) algorithm for tracking trajectories of mechanical systems with unknown nonlinearities is presented. Two processes are introduced to which the FSBLC with PD controller is applied. One is a simplified service robot capable of climbing stairs due to special wheels and the other is a propeller driven pendulum with nearly the same requirements on control. Additionally to the investigation of learning the feed forward for the desired trajectories some considerations on the implementation of such an algorithm on low cost microcontroller hardware are made. Simulations of the service robot as well as practical experiments on the pendulum show the capability of the used FSBLC algorithm to perform the task of improving control behavior for repetitive task of such mechanical systems.

Keywords : climbing stairs, FSBLC, ILC, service robot
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