

عنوان مقاله:

Robust Lyapunov-based Control of MEMS Optical Switches

محل انتشار:

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خلاصه مقاله:

In this paper, a robust PID control scheme is proposed for Micro-Electro-Mechanical-Systems (MEMS) optical switches. The proposed approach is designed in a way which solves two challenging and important problems. The first one is successful reference tracking and the second is mitigating the system nonlinearities. The overall system composed of nonlinear MEMS dynamics and the PID controller is proven to be uniformly-ultimately bounded (UUB) stable in agreement with Lyapunov's direct method in any finite region of the state space. Since the unmodeled but bounded dynamics of the system is systematically encapsulated in the system model, the only influence that this imposes on the stability is the respective bounds on the controller gains. The controller design strategy is simple and practicable with low computation burden which makes it easy to apply for control of MEMS optical switch. It also forms a constructive and conservative algorithm for suitable choice of gains in PID controller. The effectiveness of the proposed control law is verified through simulations in MATLAB/SIMULINK. It is shown that the proposed control law ensures robust stability and performance despite the modeling uncertainties.

کلمات کلیدی:

Robust PID control, Uniformly-ultimately bounded (UUB) stability, Micro-Electro Mechanical Systems (MEMS), Lyapunov Stability

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