Nonlinear control of One DOF magnetic levitation system using feedback linearization

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This paper presents nonlinear control of a magnetic levitation system using feedback linearization. The magnetic levitation system is one DOF seesaw beam with an electromagnetic actuator in one side and weight in the other side, as shown in Fig. 1 [1]. The system has three state variables: position, velocity and current. Especially, the force of the electromagnetic actuator is a nonlinear function of the position and current. Firstly, we derive the dynamic model of the system as a state-space representation [2, 3]. Secondly, we linearize the system by introducing nonlinear feedback term, which allow us to use standard linear control technique such as pole placement [4]. Then, the nonlinear control of the magnetic levitation using feedback linearization is implemented with both SIMULINK and C2000 microprocessor. Especially, we use CLA (control law acceleration) for C2000 to optimize the control algorithm. Finally, the effectiveness of the nonlinear control is verified through the comparison with a PID controller.

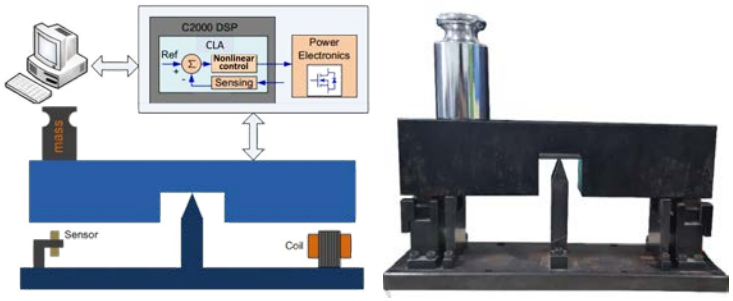

Figure 1. One DOF magnetic levitation system

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