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Neuro-sliding mode control of piezo-positioning mechanism

In this work, a Neuro-Sliding mode controller (NSMC) for piezo-positioning mechanism (PEA) was designed. This controller takes into account parameter uncertainties and unknown external disturbances. The LuGre model is used to establish the mathematical model of the system including the mechanical motion dynamics, the hysteresis friction, the load disturbance and parameter uncertainties. Using the developed model, a Neuro-Sliding mode controller based on one layered neural network with linear activation functions is proposed. The main controller goal is to minimize an error function determined from Lyapunov stability criteria and sliding-mode control theory. The validity of the proposed controller is presented using simulations results.

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