عنوان مقاله:

An Online Trajectory Tracking Control of a Double Flexible Joint Manipulator Robot by Considering the Parametric and Non-Parametric Uncertainty

محل انتشار:

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خلاصه مقاله:

Accurate trajectory tracking and control of the Double Flexible Joint Manipulator lead to design a controller with complex features. In this paper, we study two significant strategies based on improving the structure of the hybrid controller and training the controller parameters for an online estimation of time-varying parametric uncertainities. For this purpose, combination of feedback linearization with an adaptive sliding mode control by considering update mechanism is utilized to stabilize the DFJM system. The update mechanism is obtained based on gradient descend method and chain rule of the derivation. Following, in order to eliminate the tedious trial-and-error process of determining the control coefficients, an evolutionary algorithm (NSGA-II) is used to extract the optimal parameters by minimizing the tracking error and control input. In the second step, an online estimation of the designed parameters were proposed based on three intelligent methods; weighting function, Adaptive Neural Network Function Fitting (ANNF), and adaptive Neuro-fuzzy inference system (ANFIS-PSO). The proposed controller reliability finally was examined in condition of the mass and the length of the robot arm was changed and sudden disturbances were imposed at the moment of equilibrium position, simultanously. The results of the tracking error and control input of the trained proposed controller demonstrated minimal energy consumption and shorter stability time in condition that the .control parameters are constant and training are not considered

کلمات کلیدی:

Double Flexible Joint Manipulator, Gradient Descent Method, sliding mode controller, Uncertainy