عنوان مقاله:

Vibration Treatment in Cantilever Beam with Smart Material

محل انتشار:

مجله بین المللی تعامل سازه و خاک, دوره 2, شماره 1 (سال: 1397)

تعداد صفحات اصل مقاله: 8

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خلاصه مقاله:

In this study the motion equation of cantilever beam with piezoelectric patches as sensor and actuator is presented, the induced voltage in sensor has been calculated, this voltage, is the cause of strain in the beam. With convert the governing equation of beam to state space model to investigate response of vibration in cantilever beam with two piezoelectric patches. In this study 2 control methods have been used; velocity feedback and Linear-quadratic regulator LQR , to decrease vibration amplitude in cantilever beam with two piezoelectric patches as sensor and actuator. We investigate the effect of different amount of controller coefficient and the weighing matrixes on beam displacement and induced voltage in actuator. We present the calculation of optimize place for sensor and optimize length for actuator on cantilever beam. In this paper we present special method to find tip displacement in cantilever beam which is under dynamic load. We did experimental test on cantilever beams to find displacement on tip of the beam on time. We use ANN to predict tip displacement on time, so we repeat our experimental test for different beam dimension and loads, we used of test results as input data for ANN, now we have a network which can predict tip displacement of cantilever beam at any time during beam vibration. The accuracy of our network prediction is up to 98%

کلمات کلیدی:

Piezoelectric، Sensor، Actuator، Cantilever beam