

عنوان مقاله:

Optimal Locations on Timoshenko Beam with PZT S/A for Suppressing 2Dof Vibration Based on LQR-MOPSO

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خلاصه مقاله:

Neutralization of external stimuli in dynamic systems has the major role in health, life, and function of the system. Today, dynamic systems are exposed to unpredicted factors. If the factors are not considered, it will lead to irreparable damages in energy consumption and manufacturing systems. Continuous systems such as beams, plates, shells, and panels that have many applications in different industries as the main body of a dynamic system are no exceptions for the damages, but paying attention to the primary design of model the automatic control against disturbances has highly met the objectives of designers and also has saved much of current costs. Beam structure has many applications in constructing blades of gas and wind turbines and robots. When it is exposed to external loads, it will have displacements in different directions. Now, it is the control approach that prevents from many vibrations by designing an automated system. In this study, a cantilever beam has been modeled by finite element and Timoshenko Theory. Using piezoelectric as sensor and actuator, it controls the beam under vibration by LQR controller. Now, in order to increase controllability of the system and reduce the costs, there are only spots of the beam where most displacement occurs. By controlling the spots and applying force on them, it has the most effect on the beam. By multi-objective particle swarm optimization or MOPSO algorithm, the best weighting matrices coefficients of LQR controller are determined due to sensor and actuator displacement or the beam vibration is controlled by doing a control loop.

کلمات کلیدی:

Keywords : Vibration attenuation, Timoshenko beam, Optimal placement, PZT patches, LQR controller, Multi-objective particle swarm optimization

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