عنوان مقاله:

Design of optimal controller for overhead crane using genetic algorithms

محل انتشار:

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خلاصه مقاله:

In the present paper, the modeling and control of an overhead crane is considered with respect to its flexible rope and a state feedback controller is designed using genetic algorithm. First the overhead crane equations are obtained by linear system and results are optimized using genetic algorithm by the use of the control force and surface error the step response diagram of system as cost functions. Then the equations are extended to non-linear modeling with flexible rope. Linearization is based on neglecting the flexibility of the rope which leads to different results of linear system in comparison with the response of non-linear system. The designed controller for this system is a multi-objective controller that controls the position of the cart, the cart velocity, the angle and the angular velocity of the rope. Comparison between the results of linear and non-linear systems illustrates that the linear and non-linear system behaviors are approximately the same in small angular distortions. While in larger angular distortions, the oscillations increase in non-linear systems. Furthermore, the settling time in a linear system is much less than a non-linear system. Finally the overshoot in a non-linear system is clearly observed while this term is negligible in a linear system.

کلمات کلیدی:

SIMO, Multi-objective controller, Genetic algorithm, Settling time, Overshoot

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