

عنوان مقاله:

AN OPTIMAL CUCKOO SEARCH-FUZZY LOGIC CONTROLLER FOR OPTIMAL STRUCTURAL CONTROL

محل انتشار:

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نویسندگان:

M. Zabihi-Samani

M. Ghanooni-Bagha

خلاصه مقاله:

An optimal semi-active Cuckoo- Fuzzy algorithm is developed to drive the hydraulic semi-active damper for effective control of the dynamic deformation of building structures under earthquake loadings, in this paper. Hydraulic semi-active dampers (MR dampers) are semi active control devices that are managed by sending external voltage supply. A new adaptive fuzzy logic controller (FLC) is introduced to manage MR damper intelligently. Furthermore, a novel evolutionary algorithm of cuckoo search (CS) was employed to optimize the placement and the number of MR dampers and sensors in the sense of minimum resultant vibration magnitude. Numerical efforts were accomplished to validate the efficiency of proposed FLC. In designer's point of view, the proposed CS-FLC controller can find the optimal solutions during a reasonable number of iterations. Finally, The simulation results show that the developed semi-active damper can significantly enhance the seismic performance of the buildings in terms of controlled story drift and roof displacement and acceleration. CS-FLC controller uses less input energy and could find the appropriate control force and attenuates the excessive responses in several buildings. The findings in this study will help engineers to design control systems for seismic risk mitigation and effectively facilitate the performance-based seismic design.

کلمات کلیدی:

cuckoo search (CS), Hydraulic semi-active dampers, fuzzy logic control, semi-active control, performance-based seismic design

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