عنوان مقاله:

An approach for damage detection of space structures using combination of second order gradient and fuzzy logic methods

نویسندگان:

M. R. Mohammadizadeh - *Department of Civil Engineering, University of Hormozgan, Bandar Abbas, Iran*

E. Jahanfekr - *Department of Civil Engineering, University of Hormozgan, Bandar Abbas, Iran*

S. Shojaee - *Department of Civil Engineering, Shahid Bahonar University of Kerman, Kerman, Iran*

خلاصه مقاله:

This study presents a new method of damage detection using a combination of the second-order gradient Levenberg-Marquardt algorithm (SOGLMA) and fuzzy logic (FL) to solve the nonlinear damage detection equation for space frame structures. For damage detection in structures with a large number of degrees of freedom using the second-order gradient Levenberg-Marquardt algorithm, it is necessary to perform an iterative process of analysis and solving a set of simultaneous nonlinear equations that requires a lot of time. Therefore, the computation time and the number of iterations are reduced by using the proposed method "Combination of the second-order gradient Levenberg-Marquardt algorithm and fuzzy logic (SOGLMA-FL)". Acceleration response in sensor nodes obtained at different time steps from dynamic analysis are considered as input values for fuzzification. The output values of the proposed method after defuzzification are the damage extent of structural elements. The results show that the proposed damage detection method (SOGLMA-FL) has faster convergence, lower numbers of iteration and reduced computation time than the damage detection method (SOGLMA) for space frame structures.

کلمات کلیدی:

Damage detection, space structure, second-order gradient algorithm, Levenberg-Marquardt, Fuzzy logic