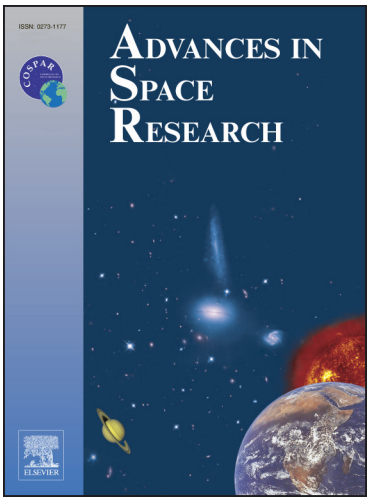

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Mosbeh R. Kaloop, Cemal O. Yigit, Jong W. Hu

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Analysis of the Dynamic Behavior of Structures Using the High-Rate GNSS-PPP Method Combined with a Wavelet-Neural Model: Numerical Simulation and Experimental Tests

Mosbeh R. Kaloop[1,2,3], Cemal O. Yigit[4], Jong W. Hu[1,2]

[1]Department of Civil and Environmental Engineering, Incheon National University, Korea

[2]Incheon Disaster Prevention Research Center, Incheon National University, Incheon, Korea

[3] Public Works and Civil Engineering Department, Mansoura University, Egypt

[4]Department of Geomatics Engineering, Gebze Technical University, Turkey

Abstract

Recently, the high rate global navigation satellite system-precise point positioning (GNSS-PPP) technique has been used to detect the dynamic behavior of structures. This study aimed to increase the accuracy of the extraction oscillation properties of structural movements based on the high-rate (10 Hz) GNSS-PPP monitoring technique. A developmental model based on the combination of wavelet package transformation (WPT) de-noising and neural network prediction (NN) was proposed to improve the dynamic behavior of structures for GNSS-PPP method. A complicated numerical simulation involving highly noisy data and 13 experimental cases with different loads were utilized to confirm the efficiency of the proposed model design and the monitoring technique in detecting the dynamic behavior of structures. The results revealed that, when combined with the proposed model, GNSS-PPP method can be used to accurately detect the dynamic behavior of engineering structures as an alternative to relative GNSS method.