

Noise Source Identification on Urban Construction Sites Using Signal Time Delay Analysis

Authors : Balgaisha G. Mukanova, Yelbek B. Utepov, Aida G. Nazarova, Alisher Z. Imanov

Abstract : The problem of identifying local noise sources on a construction site using a sensor system is considered. Mathematical modeling of detected signals on sensors was carried out, considering signal decay and signal delay time between the source and detector. Recordings of noises produced by construction tools were used as a dependence of noise on time. Synthetic sensor data was constructed based on these data, and a model of the propagation of acoustic waves from a point source in the three-dimensional space was applied. All sensors and sources are assumed to be located in the same plane. A source localization method is checked based on the signal time delay between two adjacent detectors and plotting the direction of the source. Based on the two direct lines' crossline, the noise source's position is determined. Cases of one dominant source and the case of two sources in the presence of several other sources of lower intensity are considered. The number of detectors varies from three to eight detectors. The intensity of the noise field in the assessed area is plotted. The signal of a two-second duration is considered. The source is located for subsequent parts of the signal with a duration above 0.04 sec; the final result is obtained by computing the average value.

Keywords : acoustic model, direction of arrival, inverse source problem, sound localization, urban noises

Conference Title : ICCEGE 2024 : International Conference on Civil, Environmental and Geological Engineering

Conference Location : Venice, Italy

Conference Dates : August 15-16, 2024