Researches and measurements of high–sensitive seismometers at experimental base «Obninsk»

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Abstract One of the main directions of new seismometers development for seismological monitoring systems is decreasing the instrumental noise level and nonlinearity distortions of the instrumental seismic channels. In accordance with modern requirements for high-sensitive seismological stations, the instrumental noise of seismometers should be at least three times less than local seismic background noise. By theoretical estimations modern high-sensitive seismometers have high level features: instrumental noise is lower than the minimal seismic background noise, nonlinearity factor is about 0,01% and less. However, the problem of experimental estimation of these parameters in conditions of ambient seismic backgrounds remains to be under consideration. This problem is especially important during development and production of new seismometers. The article presents some results of studying and measuring the instrumental noise level and nonlinearity factor in channels of broadband and short-period seismometers carried out at the experimental base "Obninsk". To provide a high precision of measurements, the narrow-band digital filtration and spectrum-correlation data procession technique decreasing influence of the seismic background motion on the results uncertainty were used. Due to stable temperature and insulation in the gallery of 30-meter depth, a 20-30% uncertainty for instrumental noise characteristic measuring, which is 10-30 times lower than local seismic background noise, and 0.0004% uncertainty of nonlinearity factor measuring were achieved. The seismological and environmental conditions at the experimental base "Obninsk" of the Geophysical Survey of RAS provide necessary abilities for researche and measurement of instrumental noise characteristics and non-linear distortion factor of high-sensitive seismometers with satisfactory accuracy.

Keywords: Seismometer, instrumental noise, non-linear distortion, seismic background noise, uncertainty.

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