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Coherent waves in seismology

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Seismic wavefields, being many-dimensional compound processes, involve as rectangular components wave types which possess property of coherence for some parameter. A method of separation of coherent by parameter waves and their conversion in useful for interpretation form are considered in paper. Standing waves which form in closed volumes, in stratified and block mediums are an example of coherent vibration in seismic wavefields. Standing waves are coherent in time. Head waves coherent in parallelism of catching-up time-distance curve (by multitude of wave sources) are the other example o coherent waves. Seismic records of high-stable vibrators are coherent by multitude of vibrator sessions. It enables to use this property at accumulation of vibration seismograms on distances of hundreds km from source in the presence of non-stationary noise.

The standing waves in engineering structures are especially significant in contribution to total wavefield. Using one or several reference stations (fixed stations) and one or several moving stations in engineering structure, reconstruction algorithms of coherent components allows detail in object volume wavefield of standing waves to be obtained which is easily divided into maps of amplitudes and phases of standing waves on own frequencies of engineering structure. The method of standing waves makes possible to investigate buildings at a level of construction elements.

The measurements of resonance properties of upper part of section are one of important elements of seismic microzoning. For obtaining of reliable data of standing waves in upper part of section it should be recorded microseisms in every moving point about 24 hours. At data processing by method algorithms own frequencies are chosen and maps of vibration intensification are constructed for every of own frequency and maps of accuracy of these maps.

The head waves have an interesting coherence form. For profile observation systems head wave property is known: parallelism of catching-up time-distance curve. Using this property, we can calculate coherence spectra at source averaging. Constructed algorithms allow seismograms to be filtered so that they have only head waves.