

# Spectral composition of acoustic signals of artificial sandstone samples under uniaxial loading

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The spectra of acoustic signals obtained during uniaxial compression of artificial sandstone samples under continuous loading, including transboundary states up to failure, were analyzed. The experiments were carried out on a lever press. In total, during the loading process, more than 10,000 acoustic signals were recorded that exceeded the discrimination threshold.

From 3 to 5 (in rare cases up to 7) maxima were identified in spectra of acoustic signals. As the amplitude of the maxima decreased, the corresponding frequencies were assigned a rank from 1 to 4. In the cases when the number of marked maxima was more than 4, all these maxima including forth one was assigned a rank of 4. The last rank was assigned to all peaks starting from 4, if their number exceeded 4. In general, the frequencies of ranks 1 and 2 are mainly grouped in two rather narrow intervals: 95 -100 and 65 -70 kHz. But starting from a load of 0.997 from the maximum, another interval of 10-12 kHz appears, despite the fact that at lower loads, frequencies of 1 and 2 ranks are completely absent in this interval. At the same time, under these limiting and transcendental loads, the proportion of frequencies in the range of 95–100 kHz noticeably decreases, and the overall frequency distribution of rank 3 and 4 becomes more diffuse.

The noted features of the frequency distribution of maxima in the spectra of acoustic signals can be evidence of a change in the nature of crack formation just before the destruction of the sample, and this can be considered as a precursor of coming destruction.