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Experimental Research of the low frequency wave that radiated into the air before failure or rock

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The experiment of sonic transmission shows that part energy of the wave excited by manual knock or transducer can directly transmit through the thin rock board into the air. Other part of energy of the wave can form the normal mode of vibration in the plate and excite measurable sound in the air. The dominant frequency is related to the size of the plate. These results indicate that the acoustic emission (AE) of rock can also have similar behavior if the source is shallow. It is demonstrated that with the nucleation and propagation of the cracks, the dominant frequency of the radiated wave will turn to be lower. When the frequency becomes very low, the wave can transmit through the rock into the air and be received by the microphone. According to the theory of size similar, there will be low-frequency waves before strong earthquakes because of nucleation of cracks, which can be received by special low-frequency transducer or infrasonic detector. Before earthquakes, the mechanism of precursors could be very complicated. They might be produced by plastic creep or can attribute to liquids but not brittle fracture in most cases. So the periods of the produced waves will be longer. This perhaps may account for the lack of foreshocks before many strong earthquakes.

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