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High frequency propagation in and scattering from
water-saturated granular sediments: Laboratory study

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Acoustic properties of water-saturated granular sediments at frequencies from 150 kHz to 8 MHz were studied in controlled laboratory conditions using broadband transducers. Two samples of medium sand sediments, with the same mean grain size, but with different width of the size distribution, were taken for the study, degassed, and their surface was flattened. Another sample of sediments was composed of glass beads of the same grain size. The main difference of glass beads from sand grains was their shape. Backscattering strength at normal and oblique incidence and reflection coefficient at normal incidence were measured for the three samples. The reflection experiments were made for different thicknesses of the samples, so that reflections from both first and second interfaces of the sediment layer were measured. This allowed also estimating sound speed and attenuation in the sediments. The results obtained for the three chosen types of the sediments were compared to demonstrate effects of the grain size distribution width and the grain shape on acoustic properties of the sediment. [Work supported by ONR and CNRS].