Nonlinear ultrasound parameter measurement for clay suspended particles characterization

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Finite amplitude insert substitution method is used to measure the nonlinear ultrasound parameter in clay particles suspended in water. The analytical expressions of the fundamental and the second harmonic are obtained by integrating the KZK equation in multilayer structure using the quasi-linear assumption and a set of Gaussian beams. In order to validate the technique, measurements are performed in methanol and Glycerol. The results fit well with literature ones. Then we used this technique to investigat a sample of water with clay particles. The sample is filled out into a slice layer and inserted into a well known medium orthogonally to the propagation direction. The concentration of particles ranges from 10g/l to 50g/l. The celerity, the absorption and the nonlinear coefficient are measured. We noted that the nonlinear ultrasound parameter shows a linear variation within the clay's particles concentration and it shows a good sensibility.