Numerical Support of Laboratory Experiments: Attenuation and Velocity Estimations

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A b s t r a c t

We show that numerical support of laboratory experiments can significantly increase the understanding and simplify the interpretation of the obtained laboratory results. First we perform simulations of the Seismic Wave Attenuation Module to measure seismic attenuation of reservoir rocks. Our findings confirm the accuracy of this system. However, precision can be further improved by optimizing the sensor positions. Second, we model wave propagation for an ultrasonic pulse transmission experiment used to determine pressure- and temperature-dependent seismic velocities in the rock. Multiple waves are identified in our computer experiment, including bar waves. The metal jacket that houses the sample assembly needs to be taken into account for a proper estimation of the ultrasonic velocities. This influence is frequency-dependent.

Key words: numerical modelling, ultrasonic velocities, seismic attenuation.