

Forced oscillation measurements of seismic attenuation in fluid saturated sandstone

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A b s t r a c t

Adopting the method of forced oscillation, attenuation was studied in Fontainebleau sandstone (porosity 10%, permeability 10 mD) at seismic frequencies (1–100 Hz). Confining pressures of 5, 10, and 15 MPa were chosen to simulate reservoir conditions. First, the strain effect on attenuation was investigated in the dry sample for 11 different strains across the range $1 \times 10^{-6} - 8 \times 10^{-6}$, at the confining pressure of 5 MPa. The comparison showed that a strain of at least 5×10^{-6} is necessary to obtain a good signal to noise ratio. These results also indicate that nonlinear effects are absent for strains up to 8×10^{-6} . For all the confining pressures, attenuation in the dry rock was low, while partial (90%) and full (100%) saturation with water yielded a higher magnitude and frequency dependence of attenuation. The observed high and frequency dependent attenuation was interpreted as being caused by squirt flow.

Key words: forced oscillation, sandstone, strain, attenuation.

Full text is available at

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