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MESOSCOPIC MECHANISMS OF ENERGY LOSS SEISMIC WAVE

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Abstract. The seismic wave attenuation phenomenon is very important to reservoir characterization and is related to the heterogeneities in the rocks. The seismic wave attenuation is linked to the principal pretrophysical parameter such as rock´s porosity, viscosity of the fluid that fills the porous media and permeability of the rock´s matrix.
Three different scales are used to describe the attenuation mechanism. First, the macroscopic scale, related to the wavelength of the seismic wave that corresponds to the low frequencies, second, the microscopic scale related with the porous´ rock size, and third the called mesoscopic scale, a scale intermediate between the two others.
In this work, we analyze the mesoscopic mechanism called doubled porosity in the context of the Biot´s theory. In the doubled porosity model a flux of fluid between the two media is produces by pressure gradient. We present a simplification to the double porosity model where the P and S waves are decoupled, the simplification is based in the assumption that one media is involved in the other and represented by an equivalent Biot´s media. The relation dispersion to the slow and fast P waves was obtained.
We show that the attenuation and dispersion are proportional to the volume of the media considered how secondary porosity. Additional, we show that the maximum of the wave attenuation curve is shifted to the low frequencies, result of great interest to the surface seismic exploration