SEISMIC MODEL STUDY OF REFLECTIONS IN MEDIA CONTAINING FLUIDS

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A one-dimensional model was used to study seismic wave reflections in media containing fluids. Two of the factors affecting the reflections in such media, physical properties and attenuation, have been studied.

The pulse method was used in this investigation. The one-dimensional seismic model used in this study consisted of a long rectangular rod of cardboard. Two types of fluid were used to saturate the model, water and motor oil.

The first phenomenon studied was the variation of velocity with fluid saturation. The results showed that the velocity decreased as the saturation increased. This variation was attributed to the change of the elastic constants of the medium.

Following this the attenuation of the waves propagating through the media containing fluids was studied. The pulses were digitized, and the data were then subjected to numerical Fourier analysis. The attenuation was computed from the Fourier analysis of these pulses. The results showed that the attenuation coefficient was proportional to the first power of frequency, for a rod saturated with oil, and 1.7 power of frequency for a rod saturated with water.

According to these results, the first model behaved approximately as a Kelvin-Voigt model.

The reflection and transmission coefficients of plane compressional waves were calculated. The result was that the reflection coefficient was greater in the case of two saturated rods in contact than for saturated and dry rods.