Paper 15

The effect of clay and gas on the elastic properties of sandstones

MARK SAMS[1] AND MARTIJN ANDREA[2]

[1]PETRONAS Research & Scientific Services Sdn. Bhd.
Lot 1026 PKNS Industrial Estate
54200 Ulu Klang
Selangor

[2]Imperial College
London University

Compressional and shear velocities of rocks can now be measured routinely by borehole logging. The additional information provided by the shear data can help to identify lithology and pore fluid type. In order to interpret this data quantitatively and to predict the effects of changes in reservoir properties on AVO, numerical models are required. Because sandstone reservoirs are invariably heterogeneous in terms of clay abundance, porosity and water saturation it is necessary to examine the effects of these variations on the elastic properties of sandstones. Four schemes are designed to represent four styles of clay; structural, interstitial, laminar and dispersed clay. Various modelling techniques such as the self consistent method, Kurster-Toksoz, differential effective medium modelling, Backus averaging and Voigt-Reuss-Hill averaging are employed within these schemes. Water saturation is modelled with the Biot-Gassman equations. The models indicate that the style of clay plays an important role in determining the elastic properties of sandstones. They also show that clay has different effects depending on the water saturation.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 21, No. 6, November-December 1995