



Rock Physics Model and Brittleness Index Calculation for Shale Gas Study in Jambi Basin, Indonesia

Fatkhan Fatkhan (1), Inusa P Fauzi (1), Rachmat Sule (1), and Alfian Usman (2)

(1) Institut Teknologi Bandung, Geophysical Engineering, Bandung, Indonesia (rachmat.sule@gmail.com, +62-22-253-4137),

(2) Upstream Technology Center, PT Pertamina (Persero), Indonesia

Research about shale gas is often conducted in oil and gas industries since the demand of energy supply has increased recently. Indonesia is newly interested on researching, exploring and even producing shale gas. To seek prospects of shale gas play in an area, one needs to look into some of characteristics. This paper describes about rock physics model that is used to investigate a prospect zone of shale gas play by looking into percentage of TOC and brittleness index.

Method used to modeling rock physics are as follows, first Hashin-Shtrikman bound is employed to estimate percentage of minerals, then inclusions are modeled by Kuster-Toksoz method and finally kerogens are calculated by Ciz and Shapiro's model. In addition, we compared between inclusion saturated by kerogen and water and inclusion filled up by only kerogen. Modulus Young is used to estimate brittleness index. Then in order to map and delineate brittle area, simultaneous seismic inversion method using pre stack data is employed to generate volume of P-wave, S-wave and density. Finally, these volumes are used to calculate Modulus Young value.

Since the area of study has a very thick shale then the area is divided into four zones based on modulus shear and bulk values. The rock physics model shows that there are two zones having quartz-rich mineral and the inclusion saturated by water and kerogen. More over Modulus Young calculations show there are two zones having high values or more than 50%. The rock physics model can be used for predicting mineralogy leading into zones of prospect brittle shale. These zones are then correlated with brittleness index calculations. In addition, results show that the study area has a shale gas prospect for further exploration.