INTISARI

ANALISIS PERSEBARAN RESERVOIR HIDROKARBON MENGGUNAKAN INVERSI BERBASIS MODEL DAN INVERSI STOKASTIK DI LAPANGAN "NAWASENA" CEKUNGAN JAWA TIMUR UTARA

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Lapangan Nawasena berada di Cekungan Jawa Timur Utara dengan target Formasi Kujung I yang telah terbukti sebagai reservoir hidrokarbon yang produktif di Cekungan Jawa Timur Utara. Litologi utama penyusun reservoir Formasi Kujung I adalah batuan karbonat, napal, dan *shale*. Pada penelitian ini, dilakukan analisis inversi seismik berbasis model dan inversi seismik stokastik untuk mengetahui persebaran zona reservoir berupa *porous carbonate* pada Formasi Kujung I. Data yang digunakan meliputi data seismik 3D *Pre-Stack Time Migration*, dua buah data sumur, dan dua buah *horizon*. Hasil penelitian ini menunjukkan bahwa inversi seismik stokastik dapat menunjukkan lapisan-lapisan tipis zona reservoir di Formasi Kujung I dengan resolusi mencapai 1 ms dibandingkan dengan hasil inversi seismik berbasis model. Hasil peta inversi impedansi akustik dari inversi berbasis model dan inversi stokastik menunjukkan dominasi zona reservoir berupa *porous carbonate* pada *patch reef* karbonat dengan arah timur laut menuju barat daya dengan zona non reservoir berupa napal pada tepi *patch reef* bagian timur laut. Hasil inversi stokastik menunjukkan kehadiran *tight carbonate* pada bagian tengah *patch reef* karbonat sedangkan hasil inversi berbasis model tidak menunjukkan adanya kehadiran *tight carbonate* tersebut. Hasil inversi berbasis model dan inversi stokastik menunjukkan kesesuaian dengan data produksi perusahaan yang menyatakan bahwa sumur S-3 merupakan sumur kering karena berada pada litologi napal dan struktur rendah sedangkan sumur S-4 merupakan sumur produktif karena berada pada litologi *porous carbonate* dan struktur yang tinggi. Oleh karena itu, inversi seismik berbasis model dan inversi seismik stokastik mampu menunjukkan arah persebaran zona reservoir serta penyebab adanya sumur kering dan sumur produktif.

Kata kunci: interpretasi seismik, inversi berbasis model, inversi stokastik, impedansi akustik, batuan karbonat

ABSTRACT

ANALYSIS OF RESERVOIR HYDROCARBON DISTRIBUTION USING MODEL-BASED INVERSION AND STOCHASTIC INVERSION IN THE "NAWASENA" FIELD, NORTH EAST JAVA BASIN

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The Nawasena Field is located in the North East Java Basin, with the Kujung I Formation as a target, proven to be the productive hydrocarbon reservoirs in the North East Java Basin. The primary lithologies constituting the Kujung I Formation reservoir are carbonate rocks, marl, and shale. In this study, model based and stochastic seismic inversion were conducted to determine the distribution of reservoir zones, specifically porous carbonates in the Kujung I Formation. The data used included 3D Pre-Stack Time Migration seismic data, two well datasets, and two horizon datasets. The results of this research indicate that stochastic seismic inversion can reveal thin layers of reservoir zones in the Kujung I Formation with a resolution of up to 1 ms compared to the results of model-based seismic inversion. The inversion maps of acoustic impedance from both model-based and stochastic inversions show the dominance of porous carbonate reservoir zones on the patch reef carbonate, trending from northeast to southwest, with non-reservoir zones consisting of marl at the northeastern edge of the patch reef. Stochastic inversion results indicate the presence of tight carbonate in the central part of the patch reef carbonate, while the model-based inversion results do not show the presence of tight carbonate. The results of both model-based and stochastic inversions align with the company's production data, stating that Well S-3 is a dry hole due to its location in marl lithology and low structure, while Well S-4 is a productive well as it is located in porous carbonate lithology and high structure. Therefore, model-based seismic inversion and stochastic seismic inversion are qualified to determine the direction of reservoir zone distribution and the reasons for dry hole and productive well.

Keywords: *seismic interpretation, model-based inversion, stochastic inversion, acoustic impedance, carbonate rock*