INTISARI

RELOKASI HIPOSENTER GEMPABUMI MIKRO DI LAPANGAN PANAS BUMI WAYANG WINDU MENGGUNAKAN METODE *DOUBLE DIFFERENCE*

Oleh:

Setyaningsih
12/331039/PA/14428

Lapangan produksi panas bumi Wayang Windu, Jawa Barat diinterpretasikan sebagai lapangan panas bumi transisi antara dominasi gas dan dominasi air. Lapangan tersebut terletak pada zona aktif tektonik dimana struktur patahan dominan berarah barat laut dan timur laut. Pengetahuan tentang karakteristik reservoir dan rekahan sangat penting dalam pengawasan, dan pemeliharaan sistem sekaligus meningkatkan kapasitas produksi.

Micro-earthquake adalah metode efektif untuk mengetahui karakteristik dan mengetahui arah pergerakan fluida dalam reservoir. Perpindahan fluida akibat ekstraksi dapat merubah volume dan tekanan dalam rekahan, sehingga memicu terjadinya gempabumi mikro. Sebanyak 183 kejadian (*event*) gempabumi mikro terekam selama bulan November 2014 hingga Februari 2015 dengan residual RMS (*root mean square*) awal 0,2-0,75 detik dan kesalahan lokasi 50-280 meter. Metode *Double Difference* diimplementasikan pada penelitian ini untuk meningkatkan akurasi data hiposenter gempabumi mikro di Wayang Windu. Metode ini akan memperkecil kesalahan dikarenakan struktur kecepatan menggunakan selisih waktu dua gempa.

Proses relokasi menghasilkan *cluster* yang mengandung 75 kejadian (*event*) gempa mikro dengan residual RMS (*root mean square*) 0,001-0,003 detik dan kesalahan lokasi 0,3-1,7 meter. Hasil hiposenter terelokasi memiliki pola seismisitas yang jelas dan ter-*cluster* rapat. Patahan yang diinterpretasi dari pola gempabumi mikro, memiliki arah *dip* ke timur laut dan barat daya, yang tersebar di elevasi 1500 m to -800 m. Sebaran hiposenter tersebut menunjukkan aktivitas ekstraksi fluida yang mengarah ke area sumur produksi aktif.

Kata kunci: Wayang Windu, *micro-earthquake*, *Double Difference*

ABSTRACT

MICROEARTHQUAKE HYPOCENTER RELOCATION IN WAYANG WINDU GEOTHERMAL FIELD USING DOUBLE DIFFERENCE METHOD

By:

Setyaningsih
12/331039/PA/14428

Wayang Windu Geothermal Field is a productive geothermal field in West Java, Indonesia with a vapor and liquid dominated systems. It is located in an active tectonic zone where the major structural faults are directed to northwest, and northeast trends. Understanding the reservoir performance and exploiting natural fractures is important to enhance the steam production.

The micro-earthquakes (MEQ) is a powerful method for geothermal reservoir characterization to assess the effectiveness and to image the subsurface by delineating fluids in the reservoir. Fluid movement within the reservoir assisted by fluid extraction can change in volume, the effective stress at fractures, and may trigger micro-earthquakes (MEQ) activity. During November 2014 until February 2015, 183 events of micro-earthquake have been recorded with initial travel time residual RMS (root mean square) are around 0,2-0,75 second and errors value in location are around 50-280 meters. The double difference algorithm is implemented in the hypoDD program, and used to calculate the accurate hypocentral location using the recently developed velocity model. It will minimizes the errors due to uncorrected velocity structure without the use of station corrections.

The relocation process produces a cluster consisting of 75 events with residual RMS (root mean square) until 0,003-0,001 second and location error of 0,3-1,7 meters. The relocated hypocenter have a clearer seismicity pattern and tightly clustered. The fault that generated the micro-earthquake at this field has dip towards the northeast and southwest, which extends at an elevation of 1500 m to -800 m. The distribution of hypocenter shows that the current direction of fluid extraction is toward active production wells area.

Keywords: Wayang Windu geothermal field, micro-earthquake, double difference