ABSTRAK

ANALISIS DIMENSIONALITAS DAN *PHASE TENSOR* DATA MAGNETOTELLURIK UNTUK PEMODELAN INVERSI 2D LAPANGAN PANAS BUMI "CS" DAERAH PANTI, PASAMAN, SUMATERA BARAT

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Lapangan "CS" terdapat kenampakan manifestasi air panas yang menunjukkan adanya potensi panas bumi. Manifestasi ini dikontrol oleh Sesar Panti, dan di lapangan ini terdapat banyak sesar yang mempengaruhi karakteristik sistem panas bumi. Salah satu metode yang digunakan untuk identifikasi sistem panas bumi adalah Magnetotelurik (MT). MT dapat membedakan komponen panas bumi berdasarkan respon nilai resistivitasnya, namun pada MT terdapat ambiguitas dan perbedaan orientasi.

Penelitian ini dilakukan untuk meminimalisir ambiguitas dan perbedaan orientasi dari data MT. Ambiguitas diminimalisir dengan analisis dimensionalitas yaitu melakukan analisis *Skew Swift, Skew Bahr*, dan *polar diagram*. Perbedaan arah orientasi diminimalisir dengan perhitungan *phase tensor* untuk analisis *geoelectrical strike,* kemudian dilakukan rotasi sesuai hasil analisis dan digunakan nilai sudut yang dominan. Titik pengukuran MT berjumlah 18 titik dan terbagi menjadi 3 lintasan. Jarak antar titik berkisar antara 500-1000 meter, dan jarak antar lintasan sekitar 700-1000 meter. Pemodelan 1D menggunakan inversi *Bostick* dan pemodelan 2D menggunakan inversi *Non Linear Conjugate Gradient.* Pemodelan 2D dilakukan pembandingan antara yang tidak dirotasi dengan yang dirotasi sudut *geoelectrical strike* dan ditentukan model yang paling representatif.

Hasil analisis dimensionalitas *Skew Swift* dan *Skew Bahr* menunjukkan karakter 1D/2D, dan analisis polar diagram menunjukkan karakter 2D. Analisis *geoelectrical strike* menghasilkan nilai sudut dominan N 35^0 E yang digunakan untuk rotasi. Hasil pemodelan dengan rotasi *geoelectrical strike* lebih representatif dengan (6 struktur sesuai) dibandingkan tanpa rotasi dengan (2 struktur sesuai), pemodelan yang representatif digunakan untuk interpretasi sistem panas bumi. Berdasarkan model 1D dan 2D, *caprock* memiliki nilai resistivitas <20 ohm.m, reservoar 20-200 ohm.m, dan *heat source* >200 ohm.m.

Kata kunci : dimensionalitas, *geoelectrical strike,* magnetotelurik, panas bumi, *phase tensor.*

ABSTRACT

DIMENSIONALITY AND PHASE TENSOR ANALYSIS OF MAGNETOTELLURIC DATA FOR 2D INVERSION MODELING IN THE "CS" GEOTHERMAL FIELD AT PANTI, PASAMAN, SUMATERA BARAT

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"CS" area possesses hot spring manifestations which indicate the potential for geothermal energy. This manifestation is controlled by the Panti Fault, and in this field, there are many faults which affect the characteristics of the geothermal system. One method which can be utilized to identify geothermal systems is Magnetotelluric (MT). Its clear that geothermal component is based on the response of resistivity values, while the disadvantages are ambiguities and differences in orientation

This research was conducted to minimize ambiguity and differences in orientation from MT data. Ambiguity is minimized by dimensionality analysis, then it is used to analyzing Skew Swift, Skew Bahr, and polar diagrams. The difference in orientation direction is minimized by the phase tensor for geoelectrical strike analysis, then rotation occurs according to the analysis results and using the dominant angle value. There are 18 points measurements of sounding that are divided into 3 lines. The distance between points ranges from 500-1000 meters, and the distance between lines ranges from 700-1000 meters. 1D modeling uses Bostick inversion and 2D modeling uses Non-Linear Conjugate Gradient inversion. In the 2D model, a comparison between the unrotated model and the rotated geoelectric strike angle model and determine the most representative model.

The results of dimensional analysis of skew Swift and skew Bahr to show 1D/2D characters and polar diagram analysis shows 2D characters. According to the geoelectrical strike analysis, it produces the dominant angle value of N 35^0 E then for rotation. The results of modeling with geoelectrical strike rotation are more representative (6 corresponding structures) than without rotation (2 corresponding structures), representative modeling is used for the interpretation of geothermal systems. Based on 1D and 2D models, caprock has resistivity value less than 20 ohm.m, reservoir 20-200 ohm.m, and heat source > 200 ohm.m.

Keywords : *dimensionality, geoelectrical strike, geothermal, magnetotelluric, phase tensor.*