# ABSTRAK

Pulau Jawa memiliki 11 prospek panas bumi, salah satunya berada di kawasan Gunung Arjuno–Welirang, Jawa Timur. Penelitian ini bertujuan untuk mengidentifikasi struktur geologi bawah permukaan dan potensi panas bumi di wilayah tersebut menggunakan metode gravitasi berbasis data GGMPlus. Metode yang digunakan meliputi analisis anomali Bouguer lengkap, *First Horizontal Derivative* (FHD) dan *Second Vertical Derivative* (SVD) untuk penafsiran struktur geologi, serta pemodelan 2D menggunakan metode *forward modelling* pada perangkat lunak Oasis Montaj GM-SYS. Hasil analisis mengidentifikasi 14 struktur sesar berupa sesar naik dan sesar normal yang diduga sebagai jalur migrasi fluida panas bumi. Pemodelan dilakukan pada empat lintasan sayatan (A–A′, B–B′, C–C′, dan D–D′), yang menunjukkan konfigurasi sistem panas bumi bawah permukaan terdiri dari empat lapisan utama: (1) Batuan penudung (*cap rock*) berupa lava basalt teralterasi (Qlw2, Qlw1, Qlar) dengan densitas 2,0–2,2 g/cm³, terletak pada kedalaman 0–800 meter; (2) Lapisan transisi berupa breksi vulkanik atau lava basalt alterasi ringan (densitas 2,2–2,4 g/cm³), berada pada kedalaman 800–1500 meter; (3) Reservoir panas bumi yang tersusun atas lava andesit–basaltik kekar (Qltaw, Qlk, Qlk1) dengan densitas 2,5–2,6 g/cm³, ditemukan pada kedalaman 1500–2800 meter; (4) Sumber panas berupa intrusi andesit–diorit dengan densitas 2,8 g/cm³, berada pada kedalaman >2800 meter. Konfigurasi ini menunjukkan bahwa wilayah Arjuno–Welirang memiliki potensi panas bumi yang signifikan.

Kata kunci: Panas bumi, Analisis derivatif, Pemodelan 2D, Metode Gravitasi

## ***ABSTRACT***

*Java Island hosts 11 geothermal prospects, one of which is located in the Arjuno–Welirang area, East Java. This study aims to identify subsurface geological structures and evaluate the geothermal potential of the region using gravity methods based on GGMPlus data. The methods employed include complete Bouguer anomaly analysis, First Horizontal Derivative (FHD), and Second Vertical Derivative (SVD) to interpret geological structures, as well as 2D forward modeling using the Oasis Montaj GM-SYS software. The results reveal 14 fault structures, consisting of both normal and reverse faults, which are interpreted as potential pathways for geothermal fluid migration. Forward modeling was conducted along four cross-sectional profiles (A–A', B–B', C–C', and D–D'), indicating a subsurface geothermal system composed of four primary layers: (1) A cap rock consisting of altered basaltic lava (Qlw2, Qlw1, Qlar) with a density of 2.0–2.2 g/cm³, located at depths of 0–800 meters; (2) A transition layer composed of volcanic breccia or weakly altered basaltic lava (2.2–2.4 g/cm³), found at depths of 800–1500 meters; (3) A geothermal reservoir made up of fractured andesitic–basaltic lava (Qltaw, Qlk, Qlk1) with a density of 2.5–2.6 g/cm³, located at depths of 1500–2800 meters; (4) A heat source consisting of andesitic–dioritic intrusion with a density of 2.8 g/cm³, found at depths greater than 2800 meters. This configuration suggests that the Arjuno–Welirang region possesses significant geothermal potential, supported by the presence of permeable structures, heat sources, and effective cap rocks.*


*Keywords: Geothermal, Derivative Analysis, 2D Modeling, Gravity Method*