

THE DEVELOPMENT OF AUDIO FREQUENCY MAGNETOTELLURIC METHOD FOR GEOTECHNICAL PURPOSES

ABSTRACT

This study aims to develop the Audio Frequency Magnetotelluric (ADMT) method for geotechnical applications, particularly in determining soil stratigraphy based on impedance values. Measurements were conducted at two locations: HATTI Office, Ciracas, and Duren Tiga, South Jakarta, analyzing impedance in clay, silt, and sands. The research results indicate that impedance values at HATTI Office range from 4.21 – 7.66 mV/nT for clay, 7.60 – 8.32 mV/nT for silt, and 8.32 – 11.03 mV/nT for sand. Meanwhile, at Duren Tiga, the impedance values obtained were 9.44 – 19.02 mV/nT for clay, 35.46 – 39.00 mV/nT for silt, and 35.42 – 46.44 mV/nT for sand. Correlation analysis showed a weak relationship between N-SPT values and impedance at both locations. Additionally, impedance correlation results for soil stratigraphy cannot be directly applied to other locations due to influencing factors such as metallic mineral content. The correlation results from HATTI Office applied to Duren Tiga showed a 70.83% match rate and 29.17% mismatch rate, particularly for cohesive soils. Therefore, the ADMT method can be utilized in the preliminary stages of soil investigation but still requires verification through borehole drilling and visual soil description at a minimum of one calibration point. Further research is recommended to investigate the effects of mineral content, magnetic fields, weather conditions, and various soil types and consistencies on the response of the ADMT instrument to enhance its accuracy in geotechnical exploration.

Keywords: *Audio Frequency Magnetotelluric, Impedance, Soil Stratigraphy, Geotechnical, N-SPT Correlation.*