APPLICATION OF NOISE ASSISTED MULTIVARIATE EMPIRICAL MODE DECOMPOSITION TO VERY LOW FREQUENCY ELECTROMAGNETIC METHOD FOR ANALYZING THE DAMS IN THE SIDOARJO MUD VULCANO

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ABSTRACT

A geophysical investigation to study anomalies and detect fracture zone within the subsurface of the dams using the very low frequency electromagnetic (VLF-EM) method was conducted in the Sidoarjo mud volcano. A latest data processing technique, noise-assisted multivariate empirical mode decomposition (NA-MEMD), applied to the data to denoise the signal of VLF-EM data. The NA-MEMD filtered data were then interpreted qualitatively using Karous-Hjel filter to get the current density distribution at different depths. Quantitative interpretation using the inversion of tipper data were also done to get the 2D apparent resistivity profile. The results showed that there are generally two anomalies detected in the dams, conductive and resistive anomaly. The resistive anomaly predicted as fracture has much higher resistivity value than surrounding resistivity value. While the conductive anomaly predicted as silt or the presence of water within the subsurface has much smaller resistivity value than surrounding resistivity.

Key words : VLF-EM, NA-MEMD, fracture, inversion, Karous-Hjelt.