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# Multiple Linear Regression for Rapid Estimation of Subsurface Resistivity from Apparent Resistivity Measurements

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**Abstract :** Multiple linear regression (MLR) models for fast estimation of true subsurface resistivity from apparent resistivity field measurements are developed and assessed in this study. The parameters investigated were apparent resistivity ($\rho_a$), horizontal location (X) and depth (Z) of measurement as the independent variables; and true resistivity ($\rho_t$) as the dependent variable. To achieve linearity in both resistivity variables, datasets were first transformed into logarithmic domain following diagnostic checks of normality of the dependent variable and heteroscedasticity to ensure accurate models. Four MLR models were developed based on hierarchical combination of the independent variables. The generated MLR coefficients were applied to another data set to estimate $\rho_t$ values for validation. Contours of the estimated $\rho_t$ values were plotted and compared to the observed data plots at the colour scale and blanking for visual assessment. The accuracy of the models was assessed using coefficient of determination ($R^2$), standard error (SE) and weighted mean absolute percentage error (wMAPE). It is concluded that the MLR models can estimate $\rho_t$ for with high level of accuracy.

**Keywords :** apparent resistivity, depth, horizontal location, multiple linear regression, true resistivity
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