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# Non-Invasive Soil Moisture Sensing Based on Open-Ended Waveguide and Multivariate Analysis

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## Highlights

- A non-invasive soil moisture sensing based on combining dielectric spectroscopy with multivariate analysis is proposed.
- Gain and phase spectra are tested on river sand, LECA and silty clay loam soils.
- Estimation of moisture content (%) for both non-layered and layered soils is demonstrated.
- PLS regression shows  $R^2$  up to 0.989 for river sand gain (RMSE = 0.8%).
- NPLS regression increases the accuracy of the prediction for all types of soil.

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