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Next Generation Algorithms for Water Content and Dry Density by Time Domain Reflectometry (TDR)

A new, simple, and highly accurate TDR analysis algorithm for determining soil density and water content improves upon existing standards by expanding the range of useful data and eliminating environmental and geometric effects.

Time Domain Reflectometry (TDR) is a technique commonly used to determine the dry density and water content of soil. This is extremely important for the construction of earthworks such as dams, roads, or foundations. An electric waveform is sent into the ground through conductive spikes where it reflects off discontinuities in the soil. The reflected pulse is measured and compared to the input pulse to calculate an approximation of the soil density and water content; however, existing standards of analysis only provide useful information over a short range of water contents.

Researchers at Purdue University have developed a new set of algorithms that improve upon this analysis by improving the range of useful information. The new algorithms also remove the effect of probe geometry, temperature, and pore-fluid conductivity on the results of the analysis. This next generation of TDR analysis is simple enough to be done in a single step and more accurate than the standards that are currently in place.

Advantages:

-Single step process

-Produces more accurate estimates than current algorithms

Potential Applications:

-Engineered earthworks such as roadways, dams, embankments, foundations, etc.

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