



Road assessment using Common Mid-Point approach for air-coupled antennas

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Air-coupled antennas are the most suitable for pavement assessment as they operate without traffic interference. The work presented in this article proposes a coreless GPR approach based on the Common Mid-Point method for air coupled antennas (CMP-AC), to estimate asphalt layer thickness.

This approach combined multiple GPR offset configurations for a continuous interpretation of the GPR data along the road. The survey was carried out, at traffic speed, using a pair of 1.8 GHz antennas. For each survey line, GPR data was recorded using three different antenna offsets, considering different distances between the receiver and the transmitter antennas: 0.28 m, 0.69 m and 0.97 m, A, B and C configuration, respectively.

The thickness of the bituminous layer was calculated combining the data from the different GPR offsets (A, B and C), based on the CMP-AC. For each sample, the A-Scans from the different antenna offset configurations were merged and the correction of the start time of the signal was performed adapting the surface reflection wave to the velocity of the electromagnetic wave on the air.

Applying the CMP-velocity analysis from ReflexW to the merged corrected GPR data the velocity of the propagation of the wave in the bituminous layer was determined, and then the dielectric value of the material was calculated.

Results show that the thicknesses obtained from the CMP-AC are similar to the ones obtained by the most commonly used method for GPR pavement thickness evaluation: Surface Reflection Method (SRM), corroborating the good performance of the proposed methodology.

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