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Evaluation of the feasibility of Common Mid-Point approach for air-coupled GPR applied to road pavement assessment

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Abstract

Ground Penetrating Radar (GPR) is commonly used in pavement assessment, mainly for measuring pavement layer thickness. Asphalt layer thickness is the most relevant input for flexible pavements assessment. The present study evaluates the feasibility of the Common Mid-Point (CMP) method, for a coreless GPR approach, using air-coupled antennas. Three test sections, with different asphalt layer thicknesses, were evaluated using a pair of 1.8 GHz air-coupled antennas. Results highlight the satisfactory performance of the CMP method with air-coupled antennas. The estimation of the asphalt layer thickness leads to a linear coefficient of determination greater than 0.95 when compared with the measured thickness from cores. The CMP method presented lower average absolute errors for the thinner asphalt layers (about 6 cm) in comparison with the SRM method (6% vs 18%). For thicker layers (from 11 to 13 cm), the average absolute errors for both methods were similar (approximately 7%).

Keywords: GPR; NDT; pavement structural evaluation; layer thickness; CMP; air-coupled antennas

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