



Application of Common Mid-Point Method to Estimate Asphalt

Shan Zhao and Imad Al-Aadi
United States (sxzhaoshan@gmail.com)

3-D radar is a multi-array stepped-frequency ground penetration radar (GPR) that can measure at a very close sampling interval in both in-line and cross-line directions. Constructing asphalt layers in accordance with specified thicknesses is crucial for pavement structure capacity and pavement performance. Common mid-point method (CMP) is a multi-offset measurement method that can improve the accuracy of the asphalt layer thickness estimation. In this study, the viability of using 3-D radar to predict asphalt concrete pavement thickness with an extended CMP method was investigated. GPR signals were collected on asphalt pavements with various thicknesses. Time domain resolution of the 3-D radar was improved by applying zero-padding technique in the frequency domain. The performance of the 3-D radar was then compared to that of the air-coupled horn antenna. The study concluded that 3-D radar can be used to predict asphalt layer thickness using CMP method accurately when the layer thickness is larger than 0.13m. The lack of time domain resolution of 3-D radar can be solved by frequency zero-padding.

Keywords: asphalt pavement thickness, 3-D Radar, stepped-frequency, common mid-point method, zero padding.