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The evolution of spectral analysis of surface wave method – A review

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Abstract

Spectral analysis of surface wave (SASW) method for in-situ non-destructive testing of stiffness profiles of soil and pavement sites have undergone various improvements since its inception during the 1980s. Improvements have been in both data-acquisition (sampling and sensors) as well as in data-processing (forward calculation and inversion algorithm) aspects. The present study explores the relative effectiveness of using SASW and its automation. Precise recording of amplitude value has the potential to further improve the effectiveness and develop the surface wave testing methods. Different approaches for interpreting the dispersion curve and their potential regarding sensitivity to noise, reliability, and capability to extract significant information were investigated. Finally, the suitable algorithms, finite element modelling, data acquisition and processing and the inversion procedure to provide the reliable and robust stiffness profile were illustrated in this study. After reviewing a few inversion analysis techniques, a non-linear minimization technique could perform reasonably well, which is fully automated despite some limitations. The artificial neural network could be implemented to generate the shear wave velocity profile from the dispersion curve and perform well for the upper layer's parameters. © 2021, Books and Journals Private Ltd. All rights reserved.

Author Keywords

Automation; Nondestructive testing; Spectral analysis of surface waves

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