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Influence of Source Offset on the Resolution of Dispersion Image

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Abstract

A non-invasive method called Multichannel analysis of surface waves (MASW), which has been used for geotechnical site characterization since the late 1990s, has become very prevalent. In field surveys, things like the quality of the input source and the geophone parameters (resolution, spacing, orientation layout) can have a big impact on the dispersion curve. This paper will look at how the distance between the source and the first geophone receiver (offset) affects the resolution of dispersion images in the MASW method. An experimentation site was chosen within the NIT Jamshedpur campus. According to borehole data, the location (22°46'37.2"N, 86°08'38.5"E) has a stiff silty clay soil (up to a depth of 5 m) followed by a dense to very dense weathered mica schist. A 10 kg sledgehammer was used to strike the striker plate, which generated surface waves that were recorded by 24 geophones (of 4.5 Hz frequency) arranged in a linear array pattern. Wave fields were recorded using a sampling frequency of 1000 Hz and a varying offset distance (1 m, 2 m, 4 m, 6 m, 8 m, 10 m, and 12 m) with 1 m geophone spacing and five stacking. Based on the results obtained, an optimum offset was determined as 8 m for 1000 Hz sampling frequency and 1 m geo-phone spacing, producing a high signal-to-noise ratio of 92%, resulting in an appropriate resolution of the dispersion image.

Keywords: Offset distance, Dispersion images, Active MASW, Geophones