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# Estimation of Shear Strain Magnitude due to Impact Z Section Sheet Pile Driving

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## Abstract

The rapid growth of infrastructure development in metropolitan cities is increasing in tandem with human evolution. The vibration associated with various construction activities is one of the primary issues that have evolved during infrastructure development in metropolitan cities. The construction-induced vibrations mainly occur due to pile driving, blasting, dynamic compaction, and the operation of heavy machinery on site. The dynamic behavior of the soil medium primarily depends on the magnitude of the shear strain developed in the soil media while the pile penetrates. The development of the magnitude of shear strain due to construction-induced vibration is essential to understand the soil's stiffness characteristics during pile driving. The magnitude of shear strain induced in the soil medium depends on the vibration amplitude with frequency-dependent wave velocity. A field study has been carried out to determine the ground motion parameters during impact sheet pile driving. The ground motion parameter has been obtained in terms of peak particle velocity (mm/s) with varying radial distances of 5 m to 20 m from the alignment of the sheet pile driving. The 750 kg drop hammer has been used to drive the Z section sheet pile up to a depth of 12 m from ground level. The present research work mainly focuses on estimating the shear strain magnitude induced along or very near the ground surface. The current approach relies on the wave propagation method to estimate the shear strain amplitude during Z section sheet pile driving. The values of maximum shear strain induced near the soil surface are 4.1 %, 3.65 %, 3.18 %, and 1.54 % at radial distances of 5 m, 10 m, 15 m, and 20 m, respectively during the driving of the Z section sheet pile.

**Keywords:** Shear strain magnitude, Impact hammer, Z section sheet pile driving, Construction induced vibration, Peak particle velocity