

Liquefaction Resistance Using Shear Wave Velocity

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Abstract : The cyclic resistance curves developed by Andrus and Stokoe related to shear wave velocity case history databases are frequently used in accordance with the assumption of the Seed and Idriss simplified procedure. These cyclic resistance curves were deduced using a database according to the cyclic stress ratio (CSR) proposed by Seed and Idriss. Their approach is founded on the hypothesis that the dynamic cyclic shear stress (τ_d) is always less than that given by the simplified procedure (τ_r), as deduced by Seed and Idriss through their simplifying assumptions ($r_d = \tau_d / \tau_r < 1$). In 2017, Filali and Sbartaı demonstrated that r_d can often exceed 1, and they proposed a correction for the CSR in cases where $r_d > 1$. Therefore, the correction of CSR implies that the cyclic resistance ratio (CRR) must also be corrected because it is defined by the boundary curve, which separates the liquefied and nonliquefied cases plotted using the original CSR of Seed and Idriss on which values of CRR are equal to CSR. For this purpose, in the context of this study, we have proposed in the range when the peak ground acceleration is $\leq 0.30g$, which corresponds to $r_d > 1$, a modified boundary curve in accordance with the corrected version of the simplified method, which provides the safest case, generalize its use for any used earthquakes and allows the simplified method to be the more conservative.

Keywords : liquefaction, soil, earthquake, simplified method, cyclic stress ratio, cyclic resistance ratio

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