An Energy Based Excess Pore Pressure Generation Model

Introduction: In this paper, application of energy-based models is for application in projects and problems involving liquefied soil and ground improvement projects. The GMP model is an empirical relation between dissipated shear energy and the residual excess pore pressure ratio, $\rho_u$. The GMP model has been developed based on extensive experimental and analytical investigations.

Energy-based model: The energy-based model has been developed for application to projects and problems involving liquefied soil and ground improvement projects. The GMP model is an empirical relation between dissipated shear energy and the residual excess pore pressure ratio, $\rho_u$.

Excess pore pressure generation: Excess pore pressure generation is a result of the cyclic loading of the soil. The energy dissipated in soil during cyclic loading can be used to predict the change in the pore-water pressure developed in the soil. The energy dissipated during cyclic loading is given by:

$$E_d = \int_{t_{	ext{start}}}^{t_{	ext{end}}} \frac{1}{2} \dot{\gamma}^2 \, dt$$

where $\dot{\gamma}$ is the strain rate and $t_{	ext{start}}$ and $t_{	ext{end}}$ are the start and end times of the cyclic loading.

Pore pressure model: The pore pressure model is based on accumulated stress and energy. The pore pressure model is given by:

$$u = \rho_u \sigma_m$$

where $u$ is the excess pore pressure, $\sigma_m$ is the mean effective stress, and $\rho_u$ is the residual excess pore pressure ratio.

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