Verification of Generalized Scaling Relations for Dynamic Centrifuge Experiments

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Synopsis

Dynamic centrifuge tests for pile foundations are conducted to investigate the applicability of the generalized scaling relation proposed by Iai et al. (2005). In the centrifuge tests, geometrical scale of a model pile foundation (prototype/centrifuge model) is set as 100 (= $\mu \eta$). Five combinations of scaling factors of virtual 1 g model (μ) and centrifuge model (η) are tested. According to the combination of the scaling factors, values of flexural rigidity of a pile are determined in centrifuge model. Responses in prototype scale are compared each other for five pile foundation models tested under various centrifugal accelerations. Fairly good agreements are obtained for the amplitude of input displacement and input acceleration for all the cases, except the case of large input motion. Also for the case of lower centrifugal accelerations, the agreements are significant for the average amplitude of acceleration in soil. Not only the average amplitude of responses, but also bending moment profile of lower centrifugal accelerations shows faire agreements to justify the applicability of the generalized scaling relation. When centrifugal acceleration is larger, some responses become small and the exact cause of this is unknown yet.

Keywords: similitude law, centrifuge model tests, soil structure interaction

動的遠心模型実験における拡張型相似則の検証

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要 旨

本研究では，井合ら(2005)が提案した拡張型相似則の検証を行う。地盤と構造物の動的相互作用問題について相似則の適用性を検討するため杭模型を用い，その曲げ剛性を相似則に従って5パターン変化させた実験を行う。計測データを実物スケールに変換したときに，対応する実験ケース間で振幅などの値が一致することをもって検証を行ったところ，遠心加速度が小さい場合には適用性が確認できた。

キーワード: 遠心模型実験，拡張型相似則，動的相互作用