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研究テーマ－補強材敷設領域に関する帯鋼補強土壁の地震時挙動の解明

研究背景と目的

帯鋼補強土壁 (Figure 1) は，盛土内に帯状鋼製補強材を敷設して，鉛直な壁面を構築する工法である．本工法は兵庫県南部地震において高い耐震性を証明したことから*，現在では，高速道路・鉄道を中心に計 3 万件以上建設されている．一方で，本工法の設計において，壁面の分割構造や，主働領域内の補強材に働く抵抗力が考慮されていないのが現状である．

そこで本研究では，地震時の帯鋼補強土壁において，分割壁面構造が壁面変位や補強材張力などに与える影響を明らかにすることを目的に，動的遠心模型実験を実施している．

研究手法

本研究では，実物と同じ自重応力状態を得るため，幾何学的に 1/20 の帯鋼補強土壁模型を作製した後，20 G の遠心力を載荷した．本実験では，分割壁面の挙動や，主働領域の補強材の役割を解明するために，盛土は乾燥豊浦砂，壁面は 11 段の分割模型を用い，また主働領域内補強材の有無によって 2 ケースに分けて加振を行っている (Figure 2).

研究成果

Figure 3 に加振段階ごとに変形量，補強材張力の分布を示す．補強材の無い上部の変形量の比較から，補強材張力の発生状態が，帯鋼補強土壁の安定性に寄与することを明らかにした．また，壁面変位に影響する張力と土圧の地震時履歴を一体的に計測することで，複雑な 3 要素の相互作用についての議論を可能にした．

Figure 1 : Reinforced earth wall

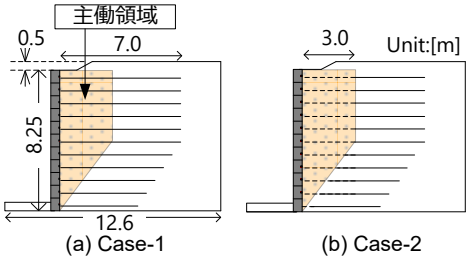

Figure. 2 Experiment case

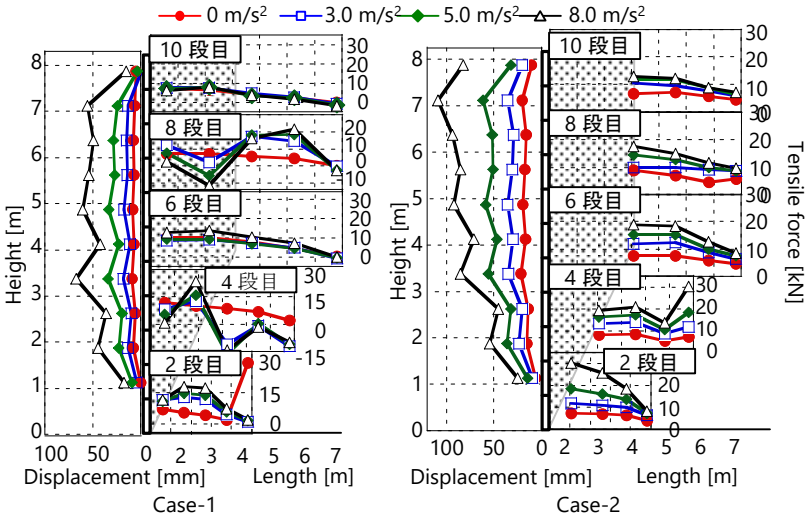

Figure. 3 Distribution of displacement and Tensile force

* 社団法人　地盤工学会：補強土入門，丸善出版，1999.

Research theme －Elucidation of reinforced earth wall seismic behavior with respect to reinforcement laying region

Research background and objective

Reinforced earth walls (REW) is built by placing steel bar reinforcements in embankment and by connecting it to vertical wall (Figure 1). Since this method of construction showed high earthquake resistance during Kobe Earthquake, now more than 30.000 projects are using this method, mainly on highways and railways. On the other hand, in the current design of this construction method, the structure division of the wall surface and the resistance force acting on the reinforcement in the active failure zone (AFZ) are not considered.

Therefore, in this study, dynamic centrifuge model tests are carried out to clarify the influence of dividing wall structure division on wall displacement and reinforcement tension of REW under earthquake excitation.

Research method

In this research, centrifuge model test were performed under gravitational acceleration of 20 G on 1/20 scale model of REW to obtain the prototype stress condition. In this test, earthquake excitation is applied on two cases: with and without reinforcement in AFZ on model with dry Toyoura sand as embankment and 11 divided segments as the vertical wall, to clarify the behavior of the divided wall and the role of the reinforcement in AFZ (Figure 2).

Results & Discussion

Figure 3 shows the distribution of displacement and reinforcement tension for each vibration stage. Comparison of the upper part displacement revealed that the reinforcement tension state contributes to the stability of REW. Moreover, by integrally measuring earthquake time history of tension and earth pressure which affect the wall displacement, it is possible to discuss the complicated interaction of those three aspects.

Figure 1：Reinforced earth wall

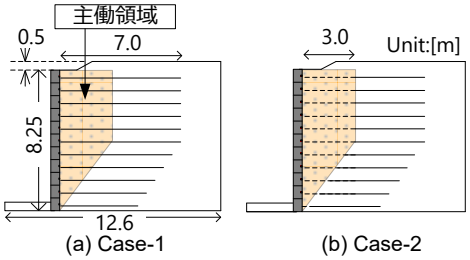

Figure. 2 Experiment case

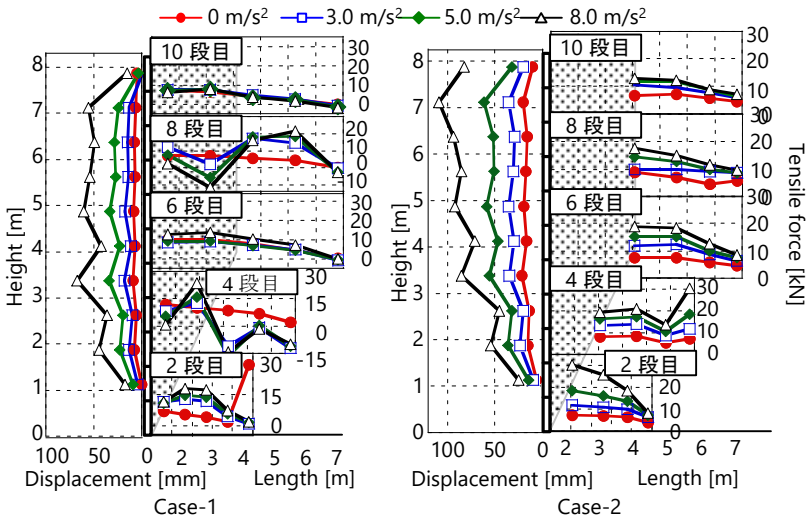

Figure. 3 Distribution of displacement and Tensile force

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