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Comparison of dynamic characteristics of the silty clay before and after freezing and thawing under the subway vibration loading

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Abstract: The long-term deformation of soft clay under the subway vibration loading has been paid more attention by researchers and engineers recently. More than 14 subway lines are in operation and some new lines are being built in Shanghai. Most of the subway tunnel are buried in the soft clay layer and the by-pass of tunnel is constructed by the artificial freezing method. In this paper, cyclic triaxial tests for the silty clay of layer No. 5 about 10 m in depth in Shanghai were conducted to study the dynamic behaviors of the silty clay before and after freezing and thawing. Based on the elastic-plastic Iwan model, the conversion between H-D model and M-D model was discussed. The cyclic triaxial tests data were fitted by the two models and the applicability of the backbone curve models to Shanghai soft clay was analyzed. Considering the influence of number of vibration, the frequency and the amplitude of deviator stress, the dynamic behaviors of the silty clay before and after freezing and thawing were compared in details through analyzing the excess pore water pressure and the axial strain development curves. The results show that the freezing-thawing clay can produce up to 26.7% larger strain and 53% higher excess pore pressure than the undisturbed clay under the same test conditions. The rates of increasing of the axial strain and the excess pore pressure decrease gradually with the increase of the number of vibration. The lower the

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