Consolidation behavior of Tianjin dredged clay using two air-booster vacuum preloading methods

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PAVP and TAVP

- **The main difference between the PAVP and TAVP methods is the air-booster equipment.**

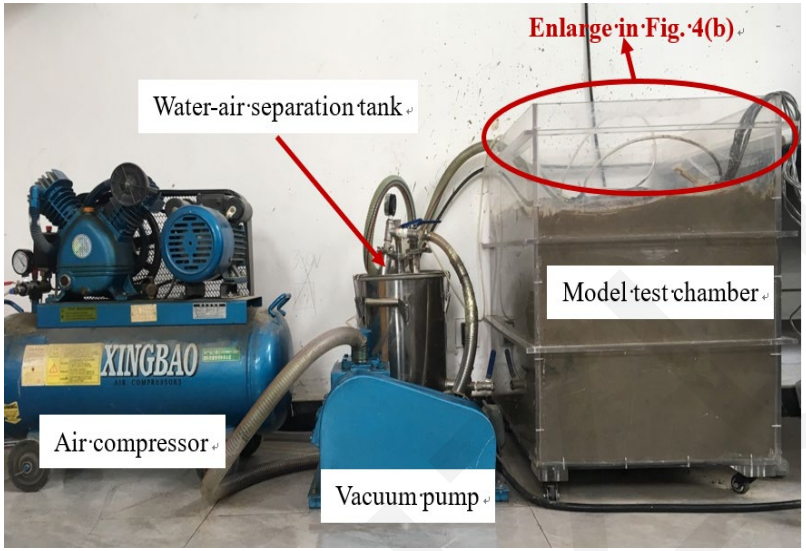


(a) air-booster PVD (b) air-booster tube

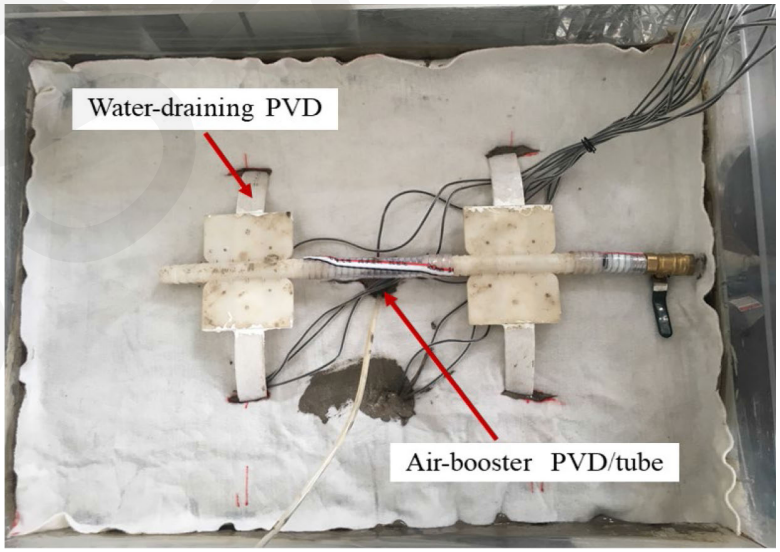
Fig. 1. Two air-booster equipment (PVD/tube).

Methodology

- **Model test: It consisted of an air compressor, a model test chamber, a water-air separation tank and a vacuum pump**



(a) experimental set up



(b) layout of water-draining PVDs and air-booster PVD/tube

Fig. 2. Air-booster vacuum preloading model test.

Methodology

- **Microstructure test: Scanning Electron Microscopy (SEM) and Mercury Intrusion Porosimetry (MIP).**



(a) SEM



(b) MIP

Fig. 3. Microstructure test instrument.

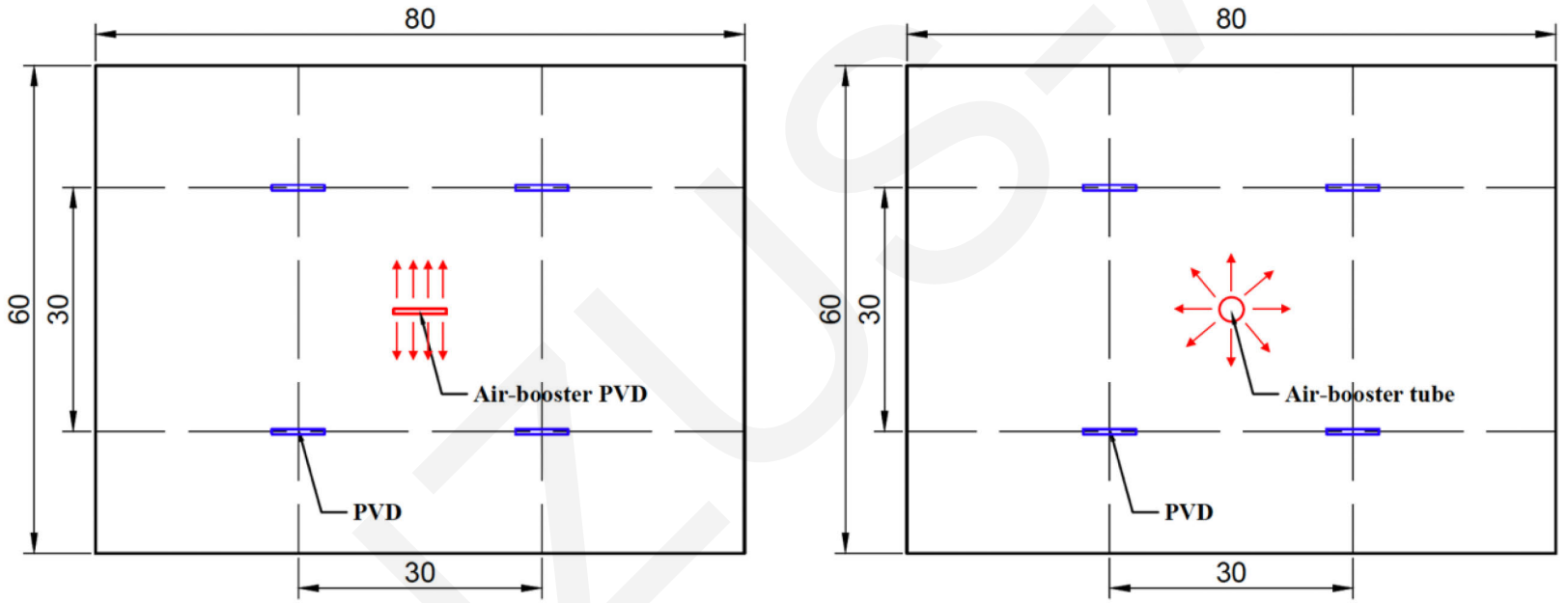
H. Y. Lei et al., Marine Georesources & Geotechnology, 38 (2020).

Results and Conclusions

- Model test: (1) Water discharge, consolidation settlement and dissipation of the pore-water pressure of the PAVP test were 13.85%, 14.39%, and 12.40% greater than those of the TAVP test, respectively. (2) PAVP test could clearly decrease the water content by 19.34% and significantly increased the dry density, vane shear strength, foundation bearing capacity, and DOC.
- Microstructure test: (1) SEM: Compared with the results of the TAVP method, after PAVP reinforcement the skeleton particle morphology was more uniform and denser, the contact forms of the particles consisted more of surface contacts, and the intraframework grain porosity was higher; in addition, the porosity and fractal dimension of the soil were smaller. (2) MIP: Peak position of the pore diameter distribution for the PAVP test was observed on the left side of that of the TAVP test, indicating that there were smaller pores in the PAVP test.
- Consolidation behavior of Tianjin dredged clay using of the PAVP method was better than that of the TAVP method.

Discussion

- **Explain the reasons for the difference between PAVP and TAVP.**



(a) PAVP (b) TAVP

Fig. 4. Action direction of air-booster pressure.

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