

Summary

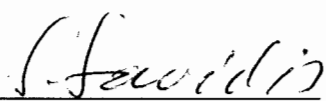
GuD Geotechnik und Dynamik Consult GmbH was commissioned by the Deutsches Institut für Bautechnik to carry out fundamental studies to measure the eroded diameter of jet columns online.

Environmental, geological and hydrological constraints request excavation pits that are horizontally sealed by jet column slabs, which are installed prior to excavation. These structural slabs must seal the excavation pits and withstand the uplift forces. It is most important to know the diameter of each column to assemble them in the required matrix.

This project was initiated, because there is currently no proven procedure to measure the diameter of jet columns underground. The tests in this research program were based on ultrasonic methods applying piezo-elements to work reversible as sender and receiver. All tests were set up with side equipment to simulate realistic conditions. The first results led to some basic amendments in test set-up such as different frequencies, improved power and a simulation of inhomogeneous slurry induced by air bubbles.

The improved tests were carried out in a special slurry tank. Compressed air was injected and a high pressure beam up to 140 bar was introduced to simulate realistic jet conditions. A special mixer was added optionally to create moderate turbulences. A major improvement for the entire set-up was a software supported evaluation which processes digital signals on preset criterias.

The signals were sent and reflected from the steel wall of the container in highly turbulent slurry and then digitally processed. The data received gave a clear indication of the distance between ultrasonic sender and the reflector. Although there were some signal distortions, the overall results were stable and can be reproduced. Additional studies are required to determine the specific speed of the signals in turbulent slurry.


Univ. Prof. Dr.-Ing. S. Savidis


Dipl.-Ing. N. Schneider