Non-Confidential Description

New Test Device Provides Highly Accurate Measurements of Swelling Soil Characteristics

Technology Case: RFT-280

Invention Summary

There are primarily two types of test devices used for measuring hydraulic flow characteristics in soils in the lab setting: rigid-wall permeameters and flexible-wall permeameters. Unfortunately, neither type of device performs well with swelling soils such as clays. A swelling soil sample in a rigid-wall device can shrink and allow fluid to seep around the sample instead of through it. A swelling soil sample in a flexible-wall device can bulge, changing the volume, surface area, and even the microstructure of the sample. The present invention addresses these problems and disadvantages by combining the best features of both types of permeameters, producing soil sample measurements with increased accuracy.

Figure 1: Picture of the New Permeameter Device in a Triaxial Cell

Benefits

- Provides accurate measurements of all soil types unparalleled by existing devices, with an emphasis on swelling soils.
- Rigid outer walls are made of porous stone, which allows confining pressure to be applied through the stone walls.
- The test device allows the use of any height of swelling soil sample, whereas previous devices must limit the height or thickness of the sample to limit the amount of bulging of the sample.
- The containing stone cylinder is split such that it can be easily removed without disturbing the enclosed sample.

Invention Premise

The new permeameter uses rigid containing walls made of porous stone (a porous stone cylinder or rings) to provide the rigidity required to contain bulging, as well as an inner flexible membrane which can be used to apply confining or constraining pressure to the enclosed sample.

A key to this invention is the use of *porous stone* for the outer containing walls, which makes this invention more than just a combination of two types of devices. The porous stone allows fluid to be passed through it so that confining water pressure can be applied to the outside of the flexible membrane containing the sample.

Patents

This technology is patent pending with worldwide rights preserved and is immediately available for licensing/partnering opportunities.

Lead Inventors

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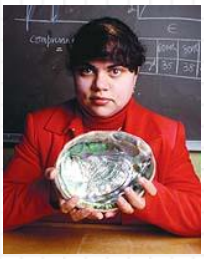
Dinesh Katti received his undergraduate degree in Civil Engineering from the National Institute of Technology in Srinagar, India. He went on to get an M.S. in Civil Engineering from Indian Institute of Technology in Bombay, and a Ph.D. in Civil Engineering from the University of Arizona at Tucson. His research areas include Geotechnical Engineering, Constitutive Modeling of Materials, Expansive Soils, Multiscale Modeling of Material Response, Bio-Nanocomposites, and Finite Element Method.



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Kalpana Katti received her undergraduate degree in Physics at the University of Delhi, India. She went on to get an M.S. in Solid State Physics in Kanpur, India, and received her Ph.D. in Material Science and Engineering at the University of Washington, Seattle. Her research areas include bone tissue engineering, biomimetics, nanotechnology, biomedical engineering, biomaterials, vibrational microspectroscopy and multiscale modeling in bio-nano composite systems.

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