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Editors:
Andrzej Zuber
Jarosław Kania
Ewa Kmiecik



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title: **A new method to measure the unsaturated properties of soils**

author(s): **Makoto Nishigaki**
Okayama University, Graduate School of Environmental Science, Japan,
n_makoto@cc.okayama-u.ac.jp

Mitsuaki Haruna
Okayama University, Graduate School of Environmental Science, Japan,
haruna-m@cc.okayama-u.ac.jp

Claudia Hartwig
Okayama University, Graduate School of Environmental Science, Japan,
claudia_hartwig@gmx.net

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Water movement in the underground is a matter of great importance for water resource management as well as stability estimations for embankments, dams and slopes among others. Water movement is generally estimated by utilizing numerical models, which require knowledge of certain hydraulic parameters, the most important one being hydraulic conductivity.

In this work, a new steady state method to determine hydraulic properties of unsaturated soils is proposed. In comparison to existing approaches, it is simpler and cheaper. The proposed constant-head system does not utilize tensiometers and moisture content measuring devices, as shown in Fig.1.

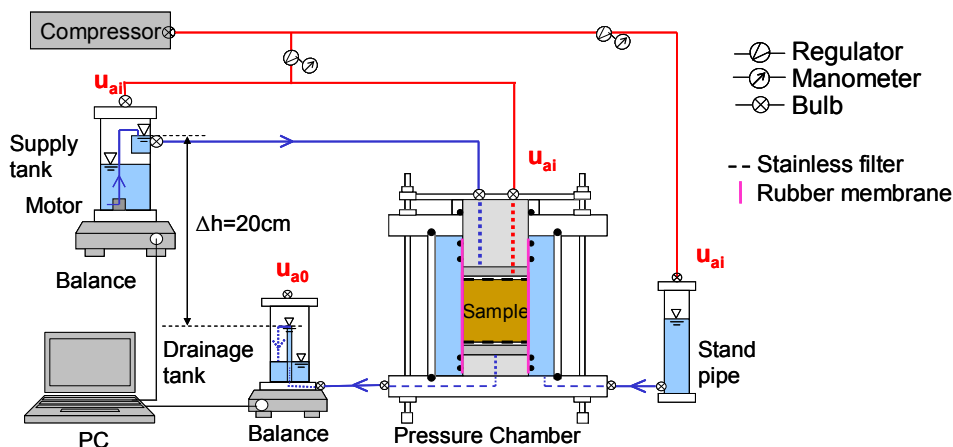


Figure 1. Configuration of the proposed measurement method for unsaturated soil properties.

In order to determine hydraulic conductivity and soil water characteristic curve, a soil sample is set into a compression test cell, which is connected to a supply tank, a drainage tank, a stand pipe and a compressor. The stand pipe, which is connected to the compressor, is used to control confining stress on the test piece within the pressure chamber. The compressor is also used to regulate pore air pressure and pressure within the supply tank. Weight of the supply tank and the drainage tank is continuously measured with electric balances and a PC. In the beginning of a test, water is absorbed in the soil sample until the saturation degree which belongs to the given air pressure is reached. Once this point is passed, the masses of supplied and drained water are equal and allow calculation of hydraulic conductivity belonging to the applied suction (air pressure in the test piece). By variation of applied air pressure the soil water characteristic curve may be obtained.

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