SIMULATOR OF IN-FIELD WETTING AND DRYING CYCLE CONDITIONS TO TEST COMPACTED SOIL SAMPLES

Innovative device that can be programmed to repeat automatic wetting and drying in-situ cycle conditions for civil engineering materials or soil samples.

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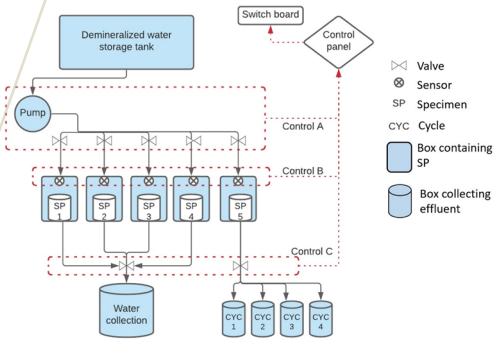
PRESENTATION

Although the standard ASTM D559 has been defined to evaluate the impact of water ingress and egress on a given soil, the current ASTM approach does not consider the soil saturation level, the temperature implemented does not represent the real situation, and the consideration of Relative Humidity (RH) and physicochemical interaction between soil and water is ignored. In this context, the proposed automated simulator brings a novel approach to monitoring the water ingression and egression phenomena continuously by considering the soil saturation level. The temperature and RH which impact such phenomena are incorporated to represent the field condition. The physicochemical interaction between each specimen and water can be analyzed simultaneously. Thus, the proposed device can evaluate the impact of the wetting and drying cycles on compacted soil in an environment that closely represents the field situation.



Schematic diagram of the proposed device

Environmental and weathering conditions simulator
Ingression and egression phenomena - Wetting-drying cycle
Compacted soil or soil-cement - ASTM D559

APPLICATIONS

- Geotechnical Engineering
- Building technology using timber
- Concrete technology
- Steel technology

INTELLECTUAL PROPERTY

Patent application filed (EP21306691.3)

DEVELOPMENT PHASE

Operational prototype (TRL6). Can be improved by the addition of a pH meter and a climate chamber box.

COMPETITIVE ADVANTAGES

- Accurate simulation of in-situ conditions
- Automated operation of continuous wetting-drying cycles
- Numerous monitoring and control parameters: temperature, RH, wetting and drying time...
- Monitoring of 1 to 5 samples at a time, separately, simultaneously, and continuously
- Comprehensive analysis: steps for performing physico-chemical assays on supernatants
- Meets the requirements of ASTM D559 and anticipates its evolution.

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PUBLICATION

Geetanjali Das et al. (2023) Physicochemical and Microstructural evaluation in lime-treated silty soil exposed to successive wetting-drying cycles submitted to different testing conditions.