

“FIT” method for calculation of soil particle size distribution from stored density- time data base

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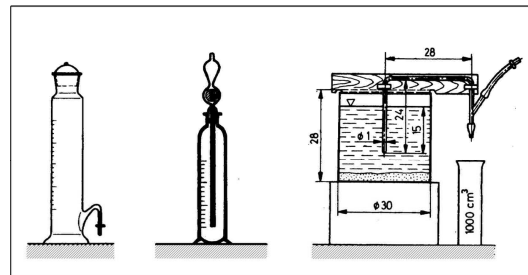
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PAST.....

The developers of ASTA confronted some special disadvantages of the original ASTA device:

- difficulties of handling of the device,
- the problems of too many wires at parallel measurements,
- the harmful effects of cylinder geometry, the accuracy of starting time determination, the chemical behavior of some special soil disperseants and dilutants on measurement results,
- etc..

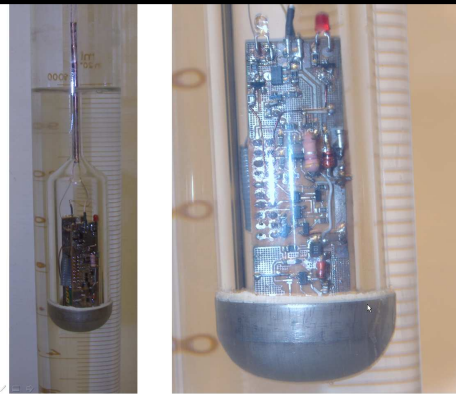


ASTA².....

In the previous stage of technical realizations the developers worked out a good, stabile and linear signal generator for water level measurement and were able to minimize the size of electronic parts of the device with low energy consumption.

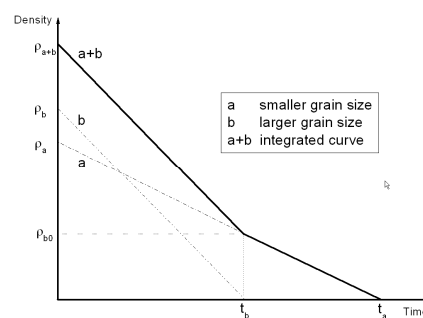
This made the building of electronics into the body of the areometer a more competitive alternative as the traditional hydrostatic ASTA measuring principle.

A solution for parallel measurements (using USB interface) was also developed, which made possible to develop the ASTA² digital areometer with returning to the old, standard hydrometer measurement principle, but with introduction of the continuous measurement ability and achieving much higher accuracy then before.



The steps of calculation:

- 1.Calculation of t_0 values of the predetermined fraction based on Stokes law.
- 2.Determination of parameters of rectangle component lines using the equations.
- 3.Repeat 2. step on each in increasing order of predetermined particle size fraction
- 4.The cumulated particle size distribution values are the b values of every component lines.



Conclusions

Considering the demand on automation of particle size distribution determination the introduction of new testing equipment was decided.

After an overview and evaluation of the standardized methods a new principle was chosen to work on. The hydrostatic principle was found adequate to make automated measurements and to create high-resolution PSD curves.

To control the theory pilot-test were done in one cylinder and multi-cylinder scales using the Automated Soil Texture Analyzer (ASTA). The high-resolution measurement results gave the opportunity to develop a new evaluation method: the method of finite tangents (FIT-method).

The mentioned device and method lead to finer measurements of particle size distribution and hopefully will give the opportunity of better understanding the environmental, geotechnical, etc. behavior of loose sediments.

