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to the

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Shashanka Sekhar Palai

DECLARATION

I certify that:

a. The work contained in the thesis is original and has been done by myself under the general supervision of my supervisor(s).

b. The work has not been submitted to any other Institute for any degree or diploma.

c. I have followed the guidelines provided by the Institute in writing the thesis.

d. I have conformed to the norms and guidelines given in the Ethical Code of Conduct of the Institute.

e. Whenever I have used materials (data, theoretical analysis, and text) from other sources, I have given due credit to them by citing them in the text of the thesis and giving their details in the references.

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ABSTRACT

In this thesis, The methods of measuring the permeability of sands in the laboratory are investigated. Constant head tests in the triaxial enclosed cell are best suited for testing large specimen under field stress conditions provided the cell is modified to eliminate leakage. Using this type of test, the validity of Darcy's law is confirmed. Falling head tests in the oedometer are very simple to perform and subject to minimal sources of errors. However, small size specimens may not be totally representative. Indirect evaluations of the permeability from consolidation tests are shown to be unreliable. In this piece of research, Development of cost effective permeability apparatus is attempted. The test set up is used to determine the laboratory hydraulic conductivity of sand in horizontal and vertical flow direction. The results are validated with that of generally found permeability results. Throughout the work, necessary steps are taken to eliminate leakage, non-laminar nature of flow and violation of Darcy's law. In the end, It can be inferred that a low cost model for measurement of field and laboratory permeability can be employed at any facility without much economical barriers.

Keywords: Permeability, Sands, Laboratory Tests, Test Equipment, Low Cost, Cost Effective.

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Chapter 1

Introduction

This here is a chapter.

1.1 Permeability

THis here is section. Try to use only subsection and not subsubsections[4]. Permeability, also known as hydraulic conductivity, is the property that represents the ease with which water flows through porous media[2].

1. Flow is normal to the soil layer.
2. Flow is parallel to the soil layer.

1.1.1 Factors affecting permeability

Permeability is depend as the property of a porous material which permits the passage or seepage of water through its interconnecting voids. Barber and Sawyer [1] shows that the finer the particles, the lower the coefficient of permeability. List of such factors that affects permeability are given below.

- Grain size
- Properties of pore water pressure
- Temperature as shown in Table 1.1

Both follow Darcy's law, i.e. Velocity of fluid in soil mass is directly proportional to Hydraulic gradient. In constant head as well as falling head it follows that. As shown in Figure 1.1

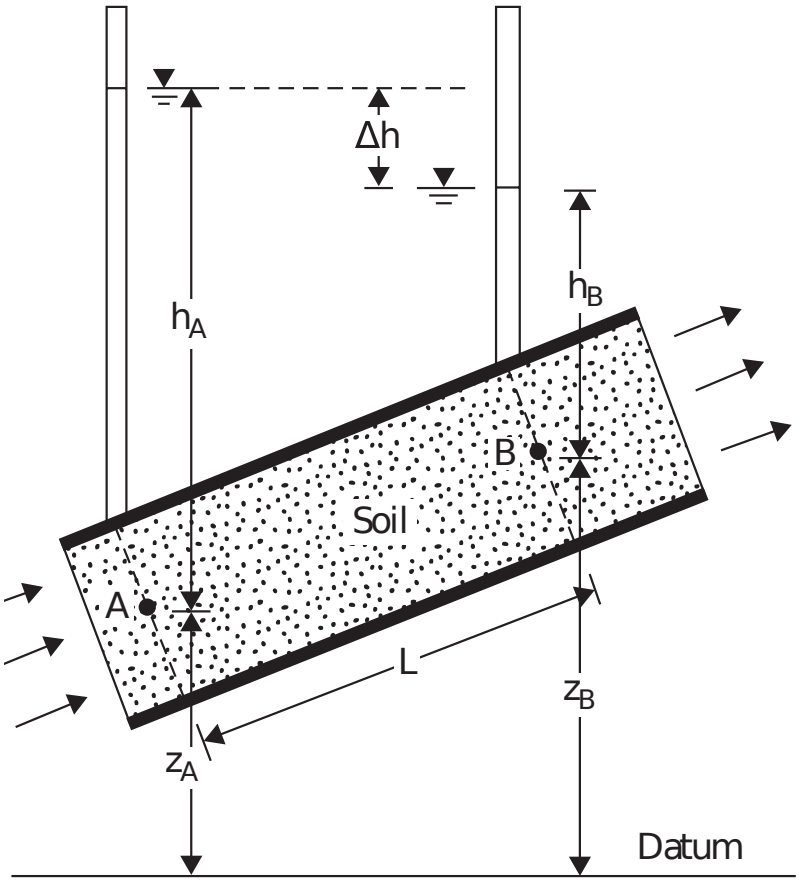

Figure 1.1: Flow according to Darcy's Law

Table 1.1: General values of Permeability of different soil

Soil	k (cm/sec)
Coarse sand	100 to 10^{-1}
Medium sand	10^{-1} to 10^{-2}
Fine sand	10^{-2} to 10^{-3}

Prakash and Sridharan [3]: A comparative study of the measured equivalent coefficient of permeability of three-layer soil sediments with the theoretically calculated values has been made.

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