International Commission on High Dams.

THE First Congress of this International Commission was held in Stockholm during June and July 1933. A number of very interesting papers were read by recognised authorities on the subject. These have now been published as the Proceedings of the First Congress in five volumes under different sub-heads. A short review of the papers dealing with the sub-head "Study of Physical Laws Governing Infiltration of Water through Earth-field Dams or Masonry Weirs on Sand Foundation", is given below.

With regard to the different forms in which the water appears in the earth, the classification adopted by Zunker[1] is mentioned and in connection with the same it is observed that the following forms with reference to the movement of water in dams must be examined:

1. The true seepage flow, that is to say, the movement of water which takes place exclusively under the influence of gravity and friction.
2. The capillary seepage flow in which, in addition to gravity and friction, capillary forces affect the movement.

The first case occurs when the flow is below a masonry weir under sand foundation or such other cases where there is no free surface of water in the sand medium. The seepage flow is a potential flow and can be treated mathematically according to the laws of potential theory.[2] As is shown by many tests[3] Darcy's Law holds good for this movement. Special emphasis is given to the electrical method[4] of investigation, which can, if necessary, be supplemented by trials with dam models through which water is flowing. The theoretical flow process can be completely and fully deduced from a complete flow diagram showing the network of flow and potential lines. The volume[5] of water flowing below a masonry floor can also be calculated.

When the medium through which water is flowing is not homogeneous the problem is more difficult; however, one can arrive at the movement of the water within each homogeneous layer. In addition to the usual boundary conditions which obtain with soils that are homogeneous throughout, there must also be taken into consideration the condition for the transit of water from one material to another. The model rule[6] that must be complied with, in such cases in order to achieve similarity of stream line diagrams both in the model and the prototype, is that the ratio between the coefficient of permeability of the individual layers under the model to be in strict conformity with that of the corresponding strata in nature.

Two types of flow are to be distinguished in connection with the capillary seepage flow:—

(*a*) The accompanying capillary flow—this refers to that movement of the water which occurs in the strip of soil that lies above the zone of the free seepage flow.

(*b*) The capillary seepage flow—in this case the water is always free, that is to say, it does not fill the whole of the pore space.

The laws governing these types of flow are still entirely unknown. For the builder of earth-filled dams, it is above all things very important to know the correct position of the seepage line. It has been shown[8] that for simple cases the theoretical flow diagrams agree with the conditions in a model and one may expect that this agreement will be maintained to a sufficient degree in the actual dam. It is stated that the capillary flow acts quite differently in the model and the prototype and as a result the laws for model naturally lose their value unless it is possible to apply the same model laws for the capillary flow. This would be possible if a liquid is used in the model the capillary elevation of which was equal to $1/n$th (n the scale ratio of the model) of the capillary elevation in the soil of the prototype.

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[1] F. Zunker, *Handbuch der Bodenlehre*, 1930, 6 Bd.

[2] Ph. Forchheimer, *Zur Grundwasserbewegung nach Isothermischen Kurvenscharen*, Wien, 1917.

[3] Th. Rehbock, "Sickerwasserbewegung im Erdreich." *Proceedings of the First Congress of High Dams*, 1933.

[4] N. N. Pavlovsky, *The Theory of Groundwater-flow under Hydrotechnical Structures*, U. S. S. R. Leningrad, 1921.

[5] T. Schaffernak and R. Dachler, *Versuchstechnische Lösung von Grundwasserproblemen.*

[6] R. Dachler, *Uber Sickerwasserströmungen in geschichtetem material.*

[7] B. Korner, *Erförschung der Physikalischen Gesetze, nach welchen die Durchsicherung des Wassers, durch eine Talsperre, order durch den Untergrund stattfindet.*

[8] R. Dachler, *Der Sickervorgang in Dammböschungen.*

International Conference of Physicists.

UNDER the auspices of the International Union of Physics and the Physical Society a Conference will be held in London in October, Professor Millikan and Lord Rayleigh presiding. The business of the Conference will include a discussion on nuclear physics, and a discussion on certain aspects of the theory of the solid state of matter. There will also be presented to the Conference a report from the Symbols, Units and Nomenclature Commission of the International Union of Physics. By the courtesy of the President and the Managers of the Royal Institution, the London meetings will be held in the Lecture Theatre of the Institution. At the invitation of Lord Rutherford the Conference will meet one day at the Cavendish Laboratory in Cambridge. Among the social events of the week will be included a reception by the President and Council of the Royal Society and a visit to the National Physical Laboratory.