SHORT COMMUNICATIONS

THE BOUNDARY CONDITIONS GOVERNING FLUID MOTIONS IN POROUS MEDIA*

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Further work has shown that the second of conditions (**2.4**) of a recent paper (Philip 1957‡), supposed to govern the potential distribution during fluid motion in a porous medium, holds only for the case of linear axial flow in tubes of general cross section. The stated condition implied that the equipotential surfaces intersected the fluid-solid interface (a stream surface) normally. This may be approximately true for all media, but it can be shown by reference to the " complete " Stokes-Navier equation ((**1.9**) of Philip 1957) to be not exact in general. It follows that equation (**2.8**) and the thermal analogy (Section III) presented in that paper hold exactly for axial flow in tubes of general cross section, but are merely approximations when applied to more general media. Exact analysis for the general medium promises to be complicated and will not be pursued here.

The exact solution given in Section IV remains valid, flow between parallel plates being a special case of axial tube flow. The rest of the paper is unaffected by the error.

It will be noted that there is no analogue between the hydrodynamic potential Φ (as defined in Philip 1957) associated with (slow, steady) viscous flow and the electrical potential arising in the corresponding problem in electrical conductivity, even though both potential distributions are solutions of Laplace's equation. The hydrodynamic equipotential surfaces do not necessarily intersect fluid-solid interfaces normally, whilst the electrical equipotential surfaces *are* normal to conductor-insulator interfaces. The equation is the same, but (some of) the boundary conditions differ between the two problems.

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‡ Philip, J. R. (1957).—*Aust. J. Phys.* **10**: 43.