

CORRESPONDENCE
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Paper No. 6023

**An investigation of the manifold problem for incompressible fluids
 with special reference to the use of manifolds for canal locks †**

by

John Allen, M.Sc., Ph.D., A.M.I.C.E., and Brian Albinson, M.Sc.

Correspondence

Mr R. A. Stephenson (Engineer's Department, Mersey Docks and Harbour Board) observed that he had found no reference in the Paper to the work in connexion with the design of the third locks of the Panama Canal; a summary of the experimental results obtained in the Panama Canal Hydraulics Laboratory during 1939 and 1940 was presented in a recent Paper.⁵

Since the method propounded in reference 5 was rather similar to that of the Authors, but with, he believed, important differences in regard to the pressure changes and shock losses in the culvert at the ports, it would be useful to have the observations of the Authors on that difference.

Mr Stephenson gave also a further reference on the general subject of manifold flow.⁶

The Authors, in reply, pointed out that the investigations in connexion with the design of the third locks of the Panama Canal had been performed on a larger and more ambitious scale than the experiments at Manchester University. Thus it had been possible in the former tests to take readings by Pitot tubes, and to observe the path of dye which had been injected at the transparent portions of the model.

With regard to the pressure changes and shock losses in the culvert at the ports, the fundamental difference in the two investigations was that the drop in the *hydraulic gradient* had been used as a criterion of loss by Soucek

† Proc. Instn Civ. Engrs, Part III, vol. 4, p. 114 (Apr. 1955).

⁵ Edward Soucek and E. W. Zelnick, "Lock manifold Experiments." Proc. Amer. Soc. Civ. Engrs, vol. 70 (1944), p. 1255.

⁶ J. S. McNown, "Mechanics of manifold flow." Proc. Amer. Soc. Civ. Engrs, vol. 79, Sep. No. 258 (Aug. 1953).

and Zelnick ; whereas the Authors had based their calculations upon the assumption that the water which continued along the culvert suffered a negligible loss of *total energy* as a result of the diverting of a section of the supply through each upstream port.

That assumption was justified by the experimental results which seemed to give similar distribution curves to those obtained from theory. The distribution curves would also appear to be of the same type as those presented by Soucek and Zelnick.

Paper No. 6014

The practical gauging of dirty water and its applications to sewer design †

by

Stanley Freemantle Mort, M.C., M.A., A.M.I.C.E.

Correspondence

Mr J. F. McIlwraith (Investigating Engineer, Sewerage, M.W.S. & D. Board, Sydney, N.S.W.) observed that the Author's work on the hydraulic design of foul-water sewers must command respect for the way in which it produced concrete results in relating all types of sewer discharge to an equivalent population. In view of the urgent need for such information it was clear that any worthwhile criticism should not harp on its possible theoretical imperfections. With that in mind Mr McIlwraith restricted his comments to aspects of the problem where elaborations were desirable or some modifications might be indicated in any future extension of the work.

He had no remark to make on Part 1 except to stress the necessity for extreme care in the field operations. The point had been implied by the Author.

Equation (2) in Part 2 followed the conventional form for that type of equation. Notwithstanding the almost universal adoption of that form of equation Mr McIlwraith considered an expression similar to the following would be better :

$$Q = aP + bP^\alpha \text{ where } a, b, \text{ and } \alpha \text{ were constants.}$$

If P in equation (2) was made sufficiently large it would be found that the peak dry-weather flow was less than the average dry-weather flow, which was absurd. The Author, in appreciating that, had restricted the range of the equation, which was satisfactory. However, a better approach

† Proc. Instn Civ. Engrs, Part III, vol. 4, p. 83 (Apr. 1955).