BOOK REVIEW

Fluid flow

Pumps, Pipes and Channels

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This book originated from a guide for process engineers, lectures given by the author and material contributed by others. It is meant to be an introductory and practical reference text to standard process flow problems aimed at engineering students in fluid mechanics, engineers who desire a refresher course in principles and standard calculations, and process engineers in first-job positions. It is the first of a number of books and future volumes are to treat liquid/liquid flows and slurry flows.

The work is presented in two sections; a shorter part on principles of fluid flow, followed by an extensive, design-style treatment covering many topics. Topics covered are: pipe systems, pumps, seals, open channel and other flows and Newtonian and non-Newtonian flows; study problems with selected solutions are also included.

The book contains a wealth of important information suitable for most design and development engineers working in the chemical and process industries. It will be of limited use to students as they need coverage of a wider range of topics and much less detailed treatment of the devices covered in the volume. Final year students working on a project in this field may find the book useful.

The material is presented in a reasonably logical order; the principles of fluid flow are discussed before the calculations on system design and component selection are considered. However, a dual system of units has been used, a number of unusual methods included and a certain lack of attention to detail has given rise to some confusion in the presentation. Some examples contributing to this view are set down below.

1. the use of a factor g_c in Newton's second law which is not needed in SI units (p. 24),
2. the introduction of an effective total head pressure and a kinetic energy coefficient (p. 39),
3. the continued confusion between Daniel Bernoulli's equation, which applies to steady, incompressible, inviscid flow along a streamline, and various other equations which are applicable to irreversible, viscous flows (p. 76, 163),
4. some of the references to thermodynamics are difficult to understand (p. 38, Eq (19)) and '... heat produced or consumed by chemical reaction or frictional losses' (p 164),
5. although lists of common symbols are given (pp. 17–29) and nomenclature for Sections 1 and 2 (pp. 129–133 and pp. 609–618), the intended meaning is not always clear, eg the use of p in Cartesian coordinates and p' in cylindrical coordinates,
6. there is already confusion between the UK and USA over the friction factor, f. Using the laminar flow case to illustrate this point, normally the UK value is $f = 16/Re$, where Re is the Reynolds number based upon the mean velocity, but the USA value is $f = 64/Re$. This book quotes the latter on p. 165 Eq (6) and p. 168 Table 3 but includes the former on Fig 1, p. 167,
7. the dot notation for differentiation with respect to time is almost folk-lore but in this book it is used to signify a point quantity,
8. perhaps a minor criticism is the lack of attention to detail, eg a cusp is shown at the centre line of the lamina velocity profile p. 81 Fig 17 and p. 98 Fig 23.

In spite of the above critical comments, an experienced engineer will find the book very useful.

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