Book Review

Hubert Chanson, Applied Hydrodynamics – An Introduction to Ideal and Real Fluid Flows, CRC Press, Taylor & Francis Group, London UK, 2009, 448 pp., 169 figs., 17 tabs., Hardcover, EUR 127.95, USD 133.90, GBP 97.00, ISBN: 978-0-415-49271-3

The topic of the book is applied hydrodynamics. Therefore, a great number of the chosen examples comes from phenomena in nature and from technical applications. The book contains two main parts, eight appendices, and four assignments.

Part I deals with the irrotational flow motion of an ideal fluid, i.e. with a non-viscous and incompressible fluid. It starts with the basic laws of fluid mechanics and with the resulting simplifications for irrational flow of ideal fluids. Examples show typical regions of ideal fluid flows for some fluid situations. The method of flow nets is demonstrated after introducing the stream function and the velocity potential. Then, analytical solutions for many two-dimensional cases are developed. The results of these potential flows are compared with real fluid flows past bodies. An introduction to conformal transformations and their application to some cases, especially to lift forces on airfoils, follows. The part ends with the treatment of free streamline outflows and flow separations. Part II contains real fluid flow considerations. It starts with the characterization of turbulence. Then, the description of the boundary layer theory follows and some applications are shown for laminar resp. turbulent boundary layers and jets. The appendices contain a glossary, some fluid properties, unit conversions, basics of mathematics, a link to the software 2DFlow+, a listing of large natural vortices in coastal zones, and of examples of civil engineering structures in the atmospheric boundary layer. The assignments show characteristics of the Alcyone ship with two rotating cylinders, applications to civil design on the Gold Coast, wind flow past a series of buildings, and prototype freighter testing.

The book contains some historical remarks and a lot of application and exercises. It handles some aspects in more detail than other books of hydrodynamics and is, thereby, a good completion of the flow mechanics literature.

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