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Book Review

Flow Around Circular Cylinders. Vol. 2: Applications
M.M. Zdravkovich, Oxford Science Publications (Oxford University Press), January 2003

This book is the keenly awaited second volume of the two volume work on Circular Cylinder Flows written by Dr. Zdravkovich. The first volume (published in 1997) dealt with fundamental flows while this second volume deals with applications. In this context the word applications mainly refers to cases which typically arise in practice, where greater complexity in the boundary conditions, often the geometric configuration or surface condition, significantly modifies the basic circular cylinder flow.

The major areas surveyed are effects of large-scale three-dimensionality (aspect ratio across a duct, free ends, taper); small scale perturbations (surface roughness, transition devices); effects of flow constraint (wall/ground plane proximity, duct blockage); effects of yaw; separation control and multi-cylinder interference. The last section on multi-cylinder flows takes up a substantial section of the book, three chapters, covering a very large range of the possible combinations which can occur in practice from pairs of cylinders to close packed arrays of cylinders in ducts typical of heat-exchanger tube banks.

Dr. Zdravkovich has spent much of his career researching and reviewing work on circular cylinder flows, his own research being particularly associated with two of these areas, namely cylinders in proximity to a wall and multi-cylinder interference. He has himself been responsible for much of the underlying research here. As a result the details given in the book are extensive and the commentary authoritative. The treatment emphasises results based on experimental measurements, using the flow physics of circular cylinders described in the first volume to explain the developments of many of the features of the more complex flows treated in this volume. Inevitably CFD simulations are referenced to a less extent reflecting their limited range of validity for these more complex flows.

The sections are well organised. In a few cases one might argue about contents and order. The effects of abruptly changing diameter and of taper might have been more logically included in the first chapter as large-scale three-dimensionality rather than in the chapter on roughness and transition devices, which act through boundary layer effects. The section on Couette Flow and Taylor Instability between concentric rotating cylinders is certainly interesting and could be considered a geometrically related limiting case of the rotating cylinder in cross-flow. But it is phenomenologically quite different from all the other flow cases in this book since no wake is involved.

However these are very minor points. Overall the book is a very clear and complete account of the way in which the fundamental properties of flow about circular cylinders are changed by local conditions or the more complex interactions of practical situations. The supporting material and references cited are comprehensive and together with its companion volume it is to be highly recommended as a reference work for anyone with a serious interest in flows around circular cylinders.

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