

Vorticity and Turbulence Effects in Fluid Structure Interaction

An Application to
Hydraulic Structure Design

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FOREWORD

This book is the collection of 11 chapters that have been contributed by each research unit joining a MIUR (Italian Ministry of University and Research) project, devoted to the topic of fluid structure interaction. The subject matter is divided into chapters covering a wide spectrum of recognized areas of research, such as: wall bounded turbulence; quasi 2-D turbulence; canopy turbulence; large eddy simulation; lake hydrodynamics; hydraulic hysteresis; liquid impacts; flow-induced vibrations; sloshing flows; transient pipe flow; and air entrainment in dropshaft.

The purpose of each chapter is to summarize the main results obtained by the individual research unit. As a result, the main feature of the book is to bring the state of the art on fluid structure interaction to the attention of the broad international community.

Each chapter has been reviewed by leading fluid mechanics scientists. Part of the material completes what already is published in international journals. This has been briefly reviewed in some of the book's chapters for clarity's sake and presented along with original results to give an exhaustive picture of each single topic. The basic mathematical formulations, the physical as well as the numerical modeling of interaction problems, are discussed.

This book is mainly aimed at fluid mechanics scientists, but it can be of value also as a reference volume to postgraduate students and practitioners in the field of fluid structure interaction.

The Editors and the Authors are grateful to Professor Carlos Brebbia, Director of the Wessex Institute of Technology, United Kingdom, and to the AFM Series Editor, Professor Matiur Rahman, Dalhousie University, Canada, for the kind invitation to publish the present book in the AFM series of the prestigious WIT Press. The generous support of the many referees who revised the chapters is gratefully acknowledged. Their considerate advices have improved the final quality of the book.

This work has received financial support by the Italian Ministry of University and Research project "Influence of vorticity and turbulence in interactions of water bodies with their boundary elements and effects on hydraulic design".

May the Editors finally add their wish, which after all is shared by any scientist, that the present book might advance this complex branch of Fluid Mechanics because, as Virgilio (Georgiche, lib.II, v.490) vividly stated: *Felix qui potuit rerum cognoscere causas* (He who succeeded in understanding the reasons of phenomena is a happy person).

The Editors
Maurizio Brocchini and Filippo Trivellato
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