Preface

Flow around a circular cylinder is a classical topic within hydrodynamics. Since the rapid expansion of the offshore industry in the sixties, the knowledge of this kind of flow has also attracted considerable attention from many mechanical and civil engineers working in the offshore field.

The purpose of the present book is

- To give a detailed, updated description of the flow pattern around cylindrical structures (including pipelines) in the presence of waves and/or current.
- To describe the impact (lift and drag forces) of the flow on the structure.
- And finally to describe the possible vibration patterns for cylindrical structures. This part will also describe the flow around a vibrating cylinder and the resulting forces.

The scope does not deviate very much from the book by Sarpkaya and Isaacson (1980) entitled "Mechanics of Wave Forces on Offshore Structures". However, while Sarpkaya and Isaacson devoted around 50% of the book to the drag-dominated regime and around 50% to diffraction, the present book concentrates mainly on the drag-dominated regime. A small chapter on diffraction is included for the sake of completeness. The reason for our concentration on the drag-dominated regime (large KC-numbers) is that it is in this field the most progress and development have taken place during the last almost 20 years since Sarpkaya and Isaacson's book. In the drag-dominated regime, flow separation, vortex shedding, and turbulence have a large impact on the resulting forces. Good understanding of this impact has been gained by detailed experimental investigations, and much has been achieved, also in the way of the numerical modelling, especially during the last 5-10 years, when the computer capacity has exploded.

In the book the theoretical and the experimental development is described. In order also to make the book usable as a text book, some classical flow solutions are included in the book, mainly as examples.

Acknowledgement:

The writers would like to express their appreciation of the very good scientific climate in the area offshore research in Denmark. In our country the hydrodynamic offshore research was introduced by professor Lundgren at our institute in the beginning of the seventies. In the late seventies and in the eighties the research was mainly concentrated in the Offshore Department at the Danish Hydraulic Institute. Significant contributions to the understanding of pipeline hydrodynamics were here obtained by Vagner Jacobsen and Mads Bryndum, two colleagues whose support has been of inestimable importance to us.

In 1984 a special grant from the university made it possible to ask one of the authors (Mutlu Sumer) to join the Danish group on offshore engineering so that he could convey his experience on fluid forces acting on small sediment particles to larger structures. This has been followed up by many grants from the Danish Technical Council (STVF), first through the FTU-programme and next through the frame-programme "Marine Technique" (1991-97). The present book is an integrated output from all these efforts and grants. The book has been typewritten by Hildur Juncker and the drawings have been prepared by Liselotte Norup, Eva Vermehren, Erling Poder, and Nega Beraki. Our librarian Kirsten Djørup has corrected and improved our written English.