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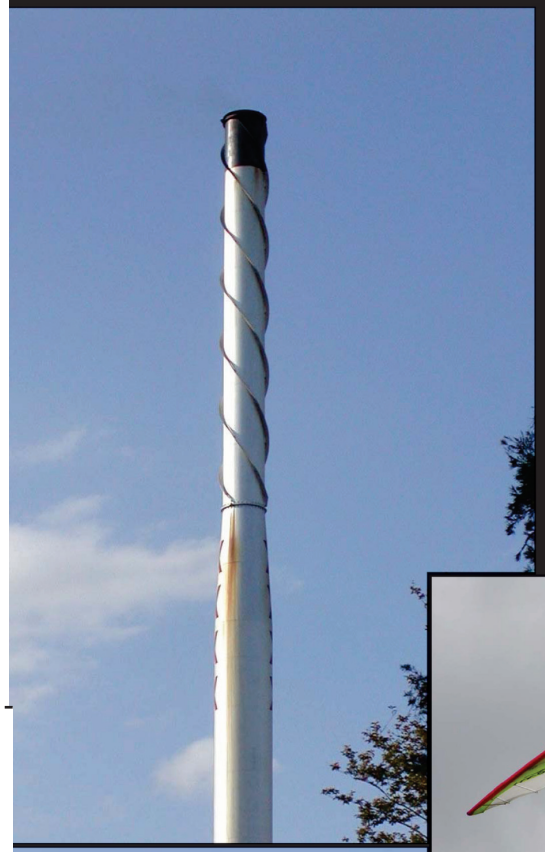

APPLIED HYDRODYNAMICS

AN INTRODUCTION TO IDEAL AND REAL FLUID FLOWS

HUBERT CHANSON

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TEXTBOOK

APPLIED HYDRODYNAMICS

AN INTRODUCTION TO IDEAL AND REAL FLUID FLOWS

Fluid dynamics is the engineering science dealing with forces and energies generated by fluids in motion. Fluid dynamics and hydro-dynamics play a vital role in everyday life. Practical examples include the flow motion in the kitchen sink, the exhaust fan above the stove, and the air conditioning system in our home. When driving a car, the air flow around the vehicle body induces some drag which increases with the square of the car speed and contributes to excess fuel consumption.

Engineering applications encompass:

- applied hydrodynamics and fluid transport in pipes and canals,
- environmental processes and transportation (cars, ships, aircrafts),
- hydraulic and coastal structures,
- wind flow around buildings,
- aerodynamics
- fluid circulations in lakes, oceans and atmosphere
- energy generation,
- fluid motion in the human body.

This advanced undergraduate and post-graduate textbook deals with the topic of applied hydrodynamics. The lecture material is grouped into two complementary sections: ideal fluid flow and real fluid flow. The former deals with two- and possibly three-dimensional fluid motions that are not subject to boundary friction effects, while the latter considers the flow regions affected by boundary friction and turbulent shear.

The lecture material is designed as an intermediate course in fluid dynamics for senior undergraduate and postgraduate students in Civil, Environmental, Hydraulic and Mechanical Engineering. It is supported in each chapter by: • notes; • applications; • remarks and discussions.

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- major homework assignments (6x)
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Hubert Chanson

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Hubert Chanson received a degree of 'Ingénieur Hydraulicien' from the Ecole Nationale Supérieure d'Hydraulique et de Mécanique de Grenoble (France) in 1983 and a degree of 'Ingénieur Génie Atomique' from the 'Institut National des Sciences et Techniques Nucléaires' in 1984. He worked for the industry in France as a R&D engineer at the Atomic Energy Commission from 1984 to 1986, and as a computer professional in fluid mechanics for Thomson-CSF between 1989 and 1990. From 1986 to 1988, he studied at the University of Canterbury (New Zealand) as part of a Ph.D. project.

Hubert CHANSON is a Professor in Hydraulic Engineering and Applied Fluid Mechanics at the University of Queensland since 1990. His research interests include design of hydraulic structures, experimental investigations of two-phase flows, coastal hydrodynamics, water quality modelling, environmental management and natural resources. In 1999 he was awarded a Doctor of Engineering from the University of Queensland for outstanding research achievements in gas-liquid bubbly flows.

Hubert CHANSON has been active also as consultant for both governmental agencies and private organisations. He is the main author of six books.

Awards received:

- The 13th Arthur Ippen award for outstanding achievements in hydraulic engineering (IAHR).
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