



Turbulence (Experimental Fluid Mechanics)

By *Christophe Bailly, Geneviève Comte-Bellot*

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This book covers the major problems of turbulence and turbulent processes, including physical phenomena, their modeling and their simulation.

After a general introduction in Chapter 1 illustrating many aspects dealing with turbulent flows, averaged equations and kinetic energy budgets are provided in Chapter 2. The concept of turbulent viscosity as a closure of the Reynolds stress is also introduced. Wall-bounded flows are presented in Chapter 3 and aspects specific to boundary layers and channel or pipe flows are also pointed out. Free shear flows, namely free jets and wakes, are considered in Chapter 4. Chapter 5 deals with vortex dynamics. Homogeneous turbulence, isotropy and dynamics of isotropic turbulence are presented in Chapters 6 and 7. Turbulence is then described both in the physical space and in the wave number space. Time dependent numerical simulations are presented in Chapter 8, where an introduction to large eddy simulation is offered. The last three chapters of the book summarize remarkable digital techniques current and experimental. Many results are presented in a practical way, based on both experiments and numerical simulations.

The book is written for a advanced engineering students as well as postgraduate engineers and researchers. For students, it contains the essential results as well as details and demonstrations whose oral transmission is often tedious. At a more advanced level, the text provides numerous references which allow readers to find quickly further study regarding their work and to acquire a deeper knowledge on topics of interest.

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Editorial Review

From the Back Cover

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About the Author

Christophe Bailly is a Professor of Fluid Dynamics and Acoustics at Ecole Centrale de Lyon (ECL). He graduated from ECL (1990), and received his PhD from Ecole Centrale Paris (ECP) in 1994. He joined the Laboratoire de mécanique des fluides et d'acoustique (LMFA, UMR CNRS 5509) at ECL in 1995. As a lecturer, he served at ECP (1995-2006) and has served at the Ecole nationale supérieure des techniques avancées (ENSTA) since 2001. In 2007, he was appointed a junior member at the Institut universitaire de France. His research activities lie in the area of turbulence and aeroacoustics. He was awarded the Yves Rocard Prize from the French Society of Acoustics (1996) and the Alexandre Joannidès Prize from the Academy of Sciences (2001). He is currently an associate editor of the American Institute of Aeronautics and Astronautics Journal since 2005.

Geneviève Comte-Bellot obtained her under-graduate diploma in 1953 at the University of Grenoble and her Master degree in Paris in 1954, at the Ecole Normale Supérieure. She obtained her Ph Degree in 1963 at the University of Grenoble in the Department of fluid dynamics. Just after having completed her PhD, Geneviève Comte-Bellot obtained a post-doc position at the Johns Hopkins University in the team of Professor Stanley Corrsin in Fluid Mechanics. Coming back to France, Geneviève Comte-Bellot, became a professor at the Ecole Centrale de Lyon (ECL), which is connected to the University of Lyon. There, she launched research into aeroacoustics and founded the Centre Acoustique at ECL. During the same time, Geneviève Comte-Bellot improved and used the constant voltage anemometer which permits to measure velocity fluctuations even when large amplitudes are present. Presently, she continues working to obtain temperature fluctuations. Geneviève Comte-Bellot is an Emeritus Professor at ECL, corresponding member of the Académie des sciences in Paris, member of the French Académie des technologies and associate member of the American National Academy of Engineering.

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