The Bioengineer's Bookshelf

Flow Visualization II, *Proceedings of the Second International Symposium of Flow Visualization,* September 9–12, 1983, Bochum, West Germany, edited by Wolfgang Merzkirch, published by Hemisphere Publication Corporation, Washington, New York, London, 1982, 803 pages. $90.

This volume contains 116 papers by authors from 30 different countries. It contains a wealth of information. Text of two general lectures are presented in full: one by F. J. Weinberg on "Optical Methods in Combustion Research," another by W.-J. Yang on "Flow Visualization Techniques in Medical and Biological Applications." Other papers are limited to 5 to 6 pages. The papers are grouped into two categories as follows:

Applications:	Combustion, furnaces
	Heat transfer, exchangers
	Fluid engines
	Industrial problems
	Pipe and channel flow
	Flow separation
	Wakes and vortices
	Boundary layers
	Supersonic flow, shock waves
	Stratified flow, oceanography
	Multiphase flow
	Rheology
	Medical problems
Methods:	Surface flow
	Tracers
	Optical methods
	Instrumentation

The book as a whole provides a panoramic view of fluid flow in many fields. There are many excellent pictures to please the eyes. There are extensive bibliographies to help checking into sources of information and further details.

I know of no better way to teach fluid mechanics and learning fluid mechanics than to see good pictures. I think books like this should be in every library.

It is impossible to single out examples for comment. From a bioengineering point of view, interesting articles are not limited to those classified as "medical problems." Frankly, I enjoy as much those photographs of recirculating flow in furnaces, or natural convection and vortex shedding. Many pictures of flow in turbomachinery, propeller blades, and pipes are breathtaking. Every paper on flow separation has something new to offer.

Papers labeled as medical are: Liepsch, et al., "Flow in Arterial Models;" Modi and Akutsu, "Heart Valve;" Henser and Kohler, "Blood Pumps;" Swanson and Clark, "Heart Valves."

But as I said, other papers, especially those in the Methods section, are also relevant.

Hemisphere Publishing Corporation is to be commended for bringing these proceedings out quickly. Hemisphere is also the publisher of the *Proceedings of the First Symposium on Flow Visualization 1977*, (Asanuma, *Flow Visualization*); Richards, *Measurement of Unsteady Fluid Dynamics Phenomena*; and Thompson and Stevenson, *Laser Velocimetry and Particle Sizing*.

Of course, in this category, nobody can beat Van Dyke, *An Album of Fluid Motion* (176 pp.) for price and excellence. For $10 you can buy a paperback copy of Van Dyke from Parabolic Press, P. O. Box 3032, Stanford, CA 94305-0030. Hardcover copy is $20.

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Arteries and Arterial Blood Flow, edited by C. M. Rodkiewicz, University of Alberta, published by Springer-Verlag, Wien, New York, 1983, as CISM Courses and Lectures No. 270, International Centre for Mechanical Sciences. 417 pages. $28.60. Photographically reproduced from author-prepared mats.

This book contains five chapters written by five authors. They are:

1 "Blood Rheology and Its Implication in Flow of Blood," by Daniel Quemada, University of Paris, VII, 127 pp.
2 "The Arterial Wall," by J. C. Barbenel, University of Strathclyde, 50 pp.
3 "Dynamics of Fluid Filled Tubes," by J. B. Haddow, University of Alberta, 36 pp.
4 "Small Arteries and the Interaction With the Cardiovascular System," by Thomas Kenner, University of Graz, 110 pp.
5 "Flow in Large Arteries," by Czeslaw M. Rodkiewicz, University of Alberta, 84 pp.

The authors are well known. Quemada's chapter is a thorough review of blood rheology. The part dealing with the effect of hematocrit is excellent. Discussion of shear thinning models is thorough. Clinical applications are summarized.

Barbenel's chapter is very lucid and covers all aspects of the arterial wall mechanics.

Haddow solves a problem of a straight thin-walled tube filled with an incompressible inviscid fluid and subjected to a concentrated external load, which is suddenly removed at time $t = 0$:

$$p_e = q\delta(x)[1 - H(t)]$$

Shell equation is used. The wall is viscoelastic. Axisymmetric deformation is assumed. The solution is elegant. The author disclaims the relevance of the problem to arterial pulse waves; and he does not explain any other motivation to solve this problem than its mathematics.

Kenner's chapter deals with the reactions of small resistance vessels to upstream and downstream conditions. He defines small arteries as those with diameters in the range from 20 to 100 μm. This is a uniquely thorough review of the mechanical properties of the vessels in this diameter range.

Finally, Rodkiewcz's paper deals with flow in straight and curved tubes with emphasis on flow in junctions. The relevance of the study to atherogenesis is discussed.

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