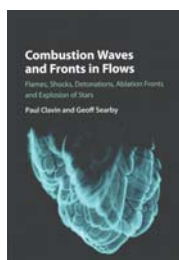


Combustion Waves and Fronts in Flows

Flames, Shocks, Detonations, Ablation Fronts and Explosion of Stars

Paul Clavin and Geoff Searby

Cambridge U. Press, 2016. \$190.00 (720 pp.). ISBN 978-1-107-09868-8



Paul Clavin and Geoff Searby's new book, *Combustion Waves and Fronts in Flows: Flames, Shocks, Detonations, Ablation Fronts and Explosion of Stars*, is a remarkable resource for both beginners and experienced researchers working in the field of combustion. Clavin and Searby were the leaders of a prominent laboratory in Marseille, France, the Institute for Research on Nonequilibrium Phenomena (IRPHE), which has been at the forefront of combustion research for more than 20 years. Their book is the most complete monograph on this topic to date. The only comparable work, Forman Williams's *Combustion Theory: The Fundamental Theory of Chemically Reacting Flow Systems* (Addison-Wesley, 1965), was the standard reference book in combustion theory until now. By skillfully adding results obtained in the past 50 years, Clavin and Searby have produced a splendid and up-to-date overview.

This book arrives at the right time to highlight the power and the importance of combustion theory. Over the past 10 years, numerical simulation, also called computational fluid dynamics, has become a standard tool in the field of reacting flows. Interest in theory has decreased as young researchers gravitated toward simulations and experimental work. This is unfortunate because theoretical results have shaped present research by providing the fundamental understanding of the mechanisms that control flames and fronts. Hopefully, Clavin and Searby will help bring young talents back to combustion theory. By gathering a century's worth of important theoretical results into a single textbook, they provide an excellent starting point for researchers who want to enter the field.

The authors use an innovative approach to organize their material. The first part of the book is a summary of the field's most important results, whereas the second part describes in detail the analytical tools used to obtain those results. Any researcher who wants to understand modern combustion research

should read the first part with attention. There, important concepts derived from theory, including flame speeds, flammability limits, ignition domains, stretch, curvature, and instabilities, are presented and explained.

The second part is more technical and will certainly become an essential reference for all readers willing to understand in detail how the material described in the first part is obtained. Many experimental results and recent simulations are used throughout the book to confirm theoretical predictions, which shows both the power and the limitations of theoretical models. Interestingly, the processes driving flames observed on Earth share many common features with mechanisms at work in stars and nuclear matter, and the authors include interesting studies of exploding stars and ablation fronts in inertial confinement fusion.

With its comprehensive, up-to-date, and creative coverage, *Combustion Waves and Fronts in Flows* fills an important gap in the existing literature and will be indispensable to researchers and students interested in the basic phenomena governing flames. I expect it will quickly become a classic in the field.

Thierry Poinso

CNRS, Institute of Fluid Mechanics
Toulouse, France

NEW BOOKS

Acoustics

Agogic Maps: From Musical Phrasing to Enhancement of Urban Spaces. R. Pe. Springer, 2017. \$54.99 *paper* (66 pp.). ISBN 978-3-319-48304-7

The Evolution of Applied Harmonic Analysis: Models of the Real World. 2nd ed. E. Prestini. Birkhäuser, 2016. \$129.00 (356 pp.). ISBN 978-1-4899-7987-2

Musical Instruments in the 21st Century: Identities, Configurations, Practices. T. Bovermann et al., eds. Springer, 2017. \$179.00 (412 pp.). ISBN 978-981-10-2950-9

Studies in Musical Acoustics and Psychoacoustics. A. Schneider, ed. Springer, 2017. \$179.00 (444 pp.). ISBN 978-3-319-47291-1

Astronomy and astrophysics

Bright Emissaries: Be Stars as Messengers of Star-Disk Physics. T. A. A. Sigut, C. E. Jones, eds. Astronomical Society of the Pacific, 2016. \$88.00 (326 pp.). ISBN 978-1-58381-896-1

The Great Canoes in the Sky: Starlore and Astronomy of the South Pacific. S. R. Chadwick, M. Paviour-Smith. Springer, 2017. \$34.00 (233 pp.). ISBN 978-3-319-22622-4

High Energy Astrophysical Techniques. R. Poggiani. Springer, 2017. \$89.99 (163 pp.). ISBN 978-3-319-44728-5

Multi-object Spectroscopy in the Next Decade: Big Questions, Large Surveys, and Wide Fields. I. Skillen, M. Balcells, S. C. Trager, eds. Astronomical Society of the Pacific, 2016. \$88.00 (476 pp.). ISBN 978-1-58381-898-5

Optical, Infrared and Radio Astronomy: From Techniques to Observation. R. Poggiani. Springer, 2017. \$89.99 (179 pp.). ISBN 978-3-319-44731-5

The Pillars of Creation: Giant Molecular Clouds, Star Formation, and Cosmic Recycling. M. Beech. Praxis/Springer, 2017. \$34.00 *paper* (269 pp.). ISBN 978-3-319-48774-8

Star Identification: Methods, Techniques and Algorithms. G. Zhang. Springer, 2017. \$179.00 (223 pp.). ISBN 978-3-662-53781-7

Studying Distant Galaxies: A Handbook of Methods and Analyses. F. Hammer, M. Puech, H. Flores, M. Rodrigues. World Scientific, 2017. \$120.00 (368 pp.). ISBN 978-1-78634-054-2

Biological and medical physics

Application of Infrared Thermography in Sports Science. J. I. Priego Quesada, ed. Springer, 2017. \$129.00 (327 pp.). ISBN 978-3-319-47409-0

Applied Physics of External Radiation Exposure: Dosimetry and Radiation Protection. R. Antoni, L. Bourgois. Springer, 2017. \$229.00 (470 pp.). ISBN 978-3-319-48658-1

Fibrous Proteins: Structures and Mechanisms. D. A. D. Parry, J. M. Squire, eds. Springer, 2017. \$239.00 (629 pp.). ISBN 978-3-319-49672-6

Medical and Biomedical Applications of Shock Waves. A. M. Loske. Springer, 2017. \$229.00 (378 pp.). ISBN 978-3-319-47568-4

Nanoscale Insights into Ion-Beam Cancer Therapy. A. V. Solov'yov, ed. Springer, 2017. \$229.00 (496 pp.). ISBN 978-3-319-43028-7

Quantitative Ultrasound and Photoacoustic Imaging for the Assessment of Vascular Parameters. K. M. Meiburger. Springer, 2017. \$99.00 (108 pp.). ISBN 978-3-319-48997-1

Radiation Physics for Medical Physicists. 3rd ed. E. B. Podgoršak. Springer, 2016. \$129.00 (906 pp.). ISBN 978-3-319-25380-0

Systems Biology of Tumor Microenvironment: Quantitative Modeling and Simulations. K. A. Rejniak, ed. Springer, 2016. \$189.00 (249 pp.). ISBN 978-3-319-42021-9