mula is still the most practical. The section also discusses various other criteria for assessing the properties of rooms.

The new section on psychological room acoustics examines the relation between what is known physically about room acoustics and what is perceived subjectively by the occupants of rooms. Throughout this section the authors emphasize the problem of quantitatively scaling people's reactions to sounds—especially such wanted sounds as speech or music. They also include a good statement on current research in concert-hall design, now at the forefront of activity but still lacking many definitive conclusions.

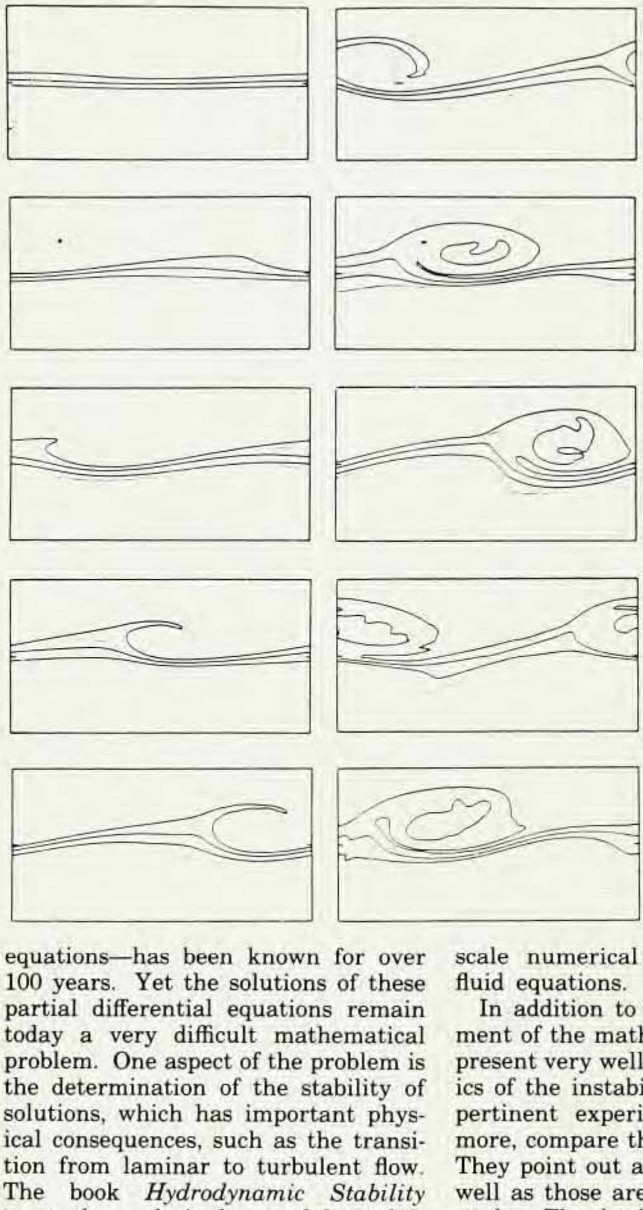
In contrast to statistical room acoustics, which starts with aggregations of sound waves in rooms (the more complicated the better), wave-theoretical room acoustics starts with the wave equation and applies it to propagation, reflection and absorption processes for a single wave. This process is done for one dimension, three dimensions, and ultimately for whole rooms, although the mathematics becomes intractable except for very simple geometric shapes. Nevertheless, wave theory does provide some useful limiting cases that relate to real rooms, if only by emphasizing the limitations of statistical room acoustics.

Who might read this book? Volume 1 seems essential reading for all practitioners of building acoustics, even architects. Chances are that it will pay for itself by providing insight into a particular problem in the first week. While Volume 2 is for more theoretically inclined acousticians, the readers of Volume 1 might be tantalized occasionally by particular cross references to Volume 2. In any case, the book is a model of clarity and good style and a pleasure to read.

Hydrodynamic Stability

P. G. Drasin, W. H. Reid
527 pp. Cambridge U.P., New York, 1982. $24.95

The study of fluid flow is an old and interesting subject. The basic physics—the Euler and Navier–Stokes



An unstable wave of the kind discussed in the book reviewed here. (Courtesy Norman Zabusky.)

equations—has been known for over 100 years. Yet the solutions of these partial differential equations remain today a very difficult mathematical problem. One aspect of the problem is the determination of the stability of solutions, which has important physical consequences, such as the transition from laminar to turbulent flow. The book *Hydrodynamic Stability* treats the analytic theory of the stability of fluid flow.

The most highly developed method used to find stability is provided by linear theory. The theory calls for considering infinitesimal perturbations about a known solution and linearizing the equations. The stability is determined by the normal modes or solutions with an experimentally determined time behavior. The present book considers three problems in great detail to illustrate the fundamental ideas and concepts of this theory: Bénard convection or thermal instability, Couette flow or rotational instability, and Poiseuille flow or shear instability. In addition, there is a chapter on nonlinear stability. Because this subject is not widely understood, the book is particularly welcome. The authors give a very nice discussion of the concepts now being developed to deal with stablity. The book restricts itself almost entirely to analytical theory and mentions little about direct large-scale numerical calculations of the fluid equations.

In addition to a very careful treatment of the mathematics, the authors present very well the underlying physics of the instabilities. They describe pertinent experiments and, furthermore, compare theory to experiments. They point out areas of agreement as well as those areas that need further study. The book contains extensive references, from current research back to the fundamental contributions of Lord Rayleigh in 1879 and other pioneers.

This is an excellent book for applied mathematicians and physicists interested in hydrodynamics. Problems at the end of each chapter and references to educational films of demonstrations and experiments on fluid flow also make this book well suited for graduate students.

RALPH MENIKOFF
Los Alamos National Laboratory

Biology and Quantum Mechanics

A. Davydov
220 pp. Pergamon, New York, 1981. $45.00

Aleksandr S. Davydov is well known and respected for his work in quantum mechanics, especially exciton theory. This book, however, has very little to do with quantum mechanics except for its brief explanation of chemical bonding and molecular theory in chapter 2 and its exposition of quantum-mechanical energy migration theory in chapter 7. It is mainly a very interesting attempt to summarize biochemistry and biophysics for scientists not already expert in biology, including physicists.

My own background is physical chemistry, and I have had to learn what biology I know as best I could over the past 20 years. While this book did not have much that was new to me in biophysics, it did provide Davydov's often fascinating summaries of the field. It is both comprehensive and quite compact—practically an outline. It should be quite useful to physicists and chemists intending to enter biology, who usually need a period of getting acquainted with it to understand what are the important current problems before they have a good chance to make significant contributions. Davydov's outline supplies much of the material they must become familiar with. While he gives an overview of present status and activity, he is also careful to point out problems still needing solution. There are indeed many challenging problems in biology whose solutions will require all types of skills, probably many not yet developed. Biology also appeals to one's interest for the kinds of structure its processes depend on. They are not just liquid or gas or crystalline structures, like those in chemistry or physics, but individual and purposeful. For example, a protein molecule may be designed with a shape and placement of electrical charges and with hinged joints such that it can recognize and grasp and alter in some predetermined way the type of molecule it acts upon.

In one particularly interesting chapter, on the structure and movement of muscles, Davydov introduces his soliton theory of muscular action. This is not yet an "accepted" theory, but it is interesting and clever. In another chapter he explains solitons in quantum-mechanical detail and explains the difference between them and excitons. He suggests that the α-helices of proteins should be able to transmit vibrational energy over their length or store it for long times as solitons, and that these transmissions could be initiated by chemical reactions, such as hydrolysis of ATP but not by absorption of radiation.

The book has limitations. Anyone concentrating on a particular area of biology will need more detailed information than can be put into a book of this size. A notable omission is the absence of the "cycle of *S*-states" shown by Bessel Kok and Pierre Joliot to be involved in the release of O_2 during photosynthesis. In addition, errors