



Oort (left) with Harlow Shapley. Photo: Dorothy Davis Locanthi, AIP Niels Bohr Library.

to concepts of ejection from spiral galaxy nuclei. They also mention one of the few current controversies: the interpretation of the peculiar radio Seyfert galaxy, NGC 1275.

Finally, there are many anecdotes sprinkled throughout the book. Oort's nostalgia for the beautiful and gracious Sterrewacht te Leiden, which was removed by the Central University authorities, is evoked. The fond remembrance of grace and style comes through in all the essays that describe Oort's office, his home, the observatory set in the lovely botanic gardens. Perhaps the most profound comment comes from H. van der Hulst's analysis at the end of the book of different styles of research and researchers. He censures the current proclivity to take sides on astronomical issues, to debate and win points, and contrasts Oort, for whom there has always been only one side and that is the truth.

HALTON ARP
Mount Wilson and Las Campanas
Observatories

Interferometry by Holography

Yu. I. Ostrovsky, M. M. Butusov,
G. V. Ostrovskaya

340 pp. Springer, New York, 1980. \$35.90

Among the fields of optics upon which holography has made an impact, perhaps the most profoundly altered is interferometry. Once a rather sophisticated technique applicable only to polished optical surfaces, interferometry has become useful in numerous fields of mechanics, solely due to the ability of holograms to store and regenerate the complex optical wavefronts from diffusely reflecting objects. Yet with this development has come a basic difficulty: The interferometry of holograms is a branch of optics whose major applications are important to people in

mechanics, who may have little training in optics. In the last two years, two important books have been published on this topic, both titled *Holographic Interferometry*, one by Charles M. Vest, the other by W. Schumann and M. Dubas. The appearance of yet a third book, by three Russian authors, is interesting because it shows what similarities and differences exist between the technologies of East and West. More important, however, we can see whether these authors have made this topic more accessible to those who have use for it. Yu. I. Ostrovsky and his colleagues have certainly been major figures in this field in Russia for all of its history, and the reader might be justified in high expectations.

For someone wishing to get started in this field, the book may be quite useful. Practically the entire first half of it is concerned with explaining the phenomena of interference and holography with various experimental issues. As may be expected, however, the setups shown reflect mostly the practical experiences of the authors and cannot be said to survey the subject exhaustively. Explanations of basic principles are quite adequate. The second half of the book, which deals with the actual techniques and theories of holographic interferometry, is carefully written and does not overtax the theoretical capacities of the reader. In some cases where involved computations are required in analyzing holographic interferograms—for example in computing three-dimensional refractive index distributions—the reader must consult the references cited. Other subjects, however, such as the use of overdetermined systems of equations for reducing the errors in measuring displacements of opaque objects, are just not mentioned. The important technique of heterodyne holographic interferometry is not discussed.

This book appears to be a useful text to introduce holographic interferometry. As such, it may enable some people to enter this field who might not otherwise find it possible. As their needs for refined analyses increase, however, they may require a deeper treatment.

KARL A. STETSON
United Technologies Research Center

Dynamics of the Upper Atmosphere

Susumu Kato

223 pp. Reidel, Dordrecht, Holland, 1980.
\$57.00

The study of upper-atmospheric dynamics has experienced rapid growth during the last two decades, thanks to two

coincident developments. First, the development of satellite and radar techniques for *in situ* measurements and remote sensing of the upper atmosphere freed the researcher from reliance on ground-level measurements. Second, the evolution of high-speed computers permitted sophisticated simulations that were sufficiently realistic to be compared directly with upper-atmospheric measurements.

The ionospheric region of the upper atmosphere (centered near 300-km altitudes) has received close attention because the presence of ions makes detection of atmospheric motions particularly easy. Although ions are present only in trace amounts and therefore have little effect on atmospheric motions, they serve as tracers of these motions as they are driven by the neutral wind and the Earth's magnetic field.

This book, the first of a series of monographs in earth and planetary sciences, is a well-balanced exposition of upper-atmospheric dynamics, a field to which the author is a long-time contributor. After a general introduction in Chapter 1 to the fundamental hydrodynamic equations and the steady-state atmosphere, Chapter 2 discusses internal acoustic gravity waves in the upper atmosphere and treats theoretically wave excitation by point and line sources, both stationary and moving. The chapter also describes traveling ionospheric disturbances, which were first observed as distinct phenomena but are now known to be simply ionospheric motions induced by passage of internal gravity waves in the neutral atmosphere.

The next chapter thoroughly reviews atmospheric tides, which are internal gravity waves excited by solar or lunar gravity with periods of one solar or lunar day and their harmonics. Chapter 4, introducing the electrodynamics of the upper atmosphere, describes how motions of the neutral atmosphere drive ions to produce such observable phenomena as electron density fluctuations and ionospheric currents (such as the auroral and equatorial electrojets). The final chapter discusses the tidal dynamo, the global system of currents and electromagnetic fields generated by motions of the partially ionized atmosphere across the Earth's magnetic field.

The exposition is thorough enough to include both simple theory, such as gravity-wave propagation in an isothermal inviscid atmosphere, and extensive discussion of the most realistic computer simulations, augmented by generous use of figures reproduced from recently published research. However, the book makes no concessions to the casual reader; rich in detail but sparse in descriptive text, it requires the reader