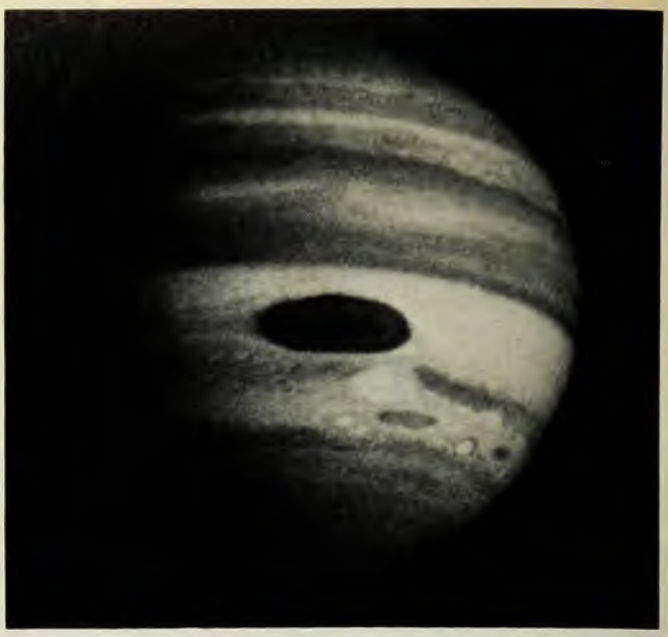

Planetary photography is featured in two recent government publications: Farouk El-Baz, *Astronaut Observations from the Apollo-Soyuz Mission* (Smithsonian Studies in Air and Space, No. 1) (Smithsonian Institution, Washington, D.C., 1977) and Richard O. Fimmel, William Swindell and Eric Burgess, *Pioneer Odyssey* (NASA SP-396) (USGPO, Washington, D.C., 1977). The latter volume is a revision of NASA SP-349 and includes data obtained not only from Pioneer 10, but also from Pioneer 11 as well. The photograph at left is a view looking southeastward at Egypt, Sinai, Saudi Arabia, the Red Sea and the Nile Valley. The Pioneer 11 photograph at right is of Jupiter with its Great Red Spot, taken at a distance of 1 100 000 kilometers. (Photographs courtesy of NASA)

phasized. On the other hand, topics such as charge exchange, ionization, recombination, excitation and atomic radiation receive proportionately more complete coverage than might be expected from a book with this title. The choice of topics reflects the interests of the author, Boris M. Smirnov, who has been teaching a course of lectures based on the subjects covered in this book at the Moscow Power-Engineering Institute. He is also editor-in-chief of the Soviet journal *Plasma Chemistry*. Some of the other topics treated include transport phenomena, kinetic theory, distribution functions, waves and the ionosphere.

The level of presentation is apparently meant to be suitable for a student who has had an introductory course in quantum mechanics as well as a basic course in electromagnetic theory and an acquaintance with fluid equations. Smirnov tries to use simple physical explanations with a minimum of mathematical analysis. While this is an admirable approach, it does not always work. Sometimes the "simple" treatment seems more difficult to follow than a presentation that used a little more mathematics would be.

Also, unfortunately, Smirnov makes a number of errors and unstated assumptions that would often cause difficulties for a student. For example, on page 92, equations (7.29) neglect inertia, equilibrium density gradients and time dependence, without so stating and without giving justification. Also, an elementary error in relating density perturbations to temperature and pressure perturbations appears on the same page. As another example, on page 39, Smirnov asserts without qualification that the main contribution to the average scattering cross section is from large-angle deflections. While this is true for charged-particle–neutral-particle collisions, it certainly does not apply to collisions between charged particles that interact via the long-range Coulomb potential.

This book is printed in the Soviet Union and is being imported for sale in the United States. The translation is adequate although some unimportant peculiarities of usage do occur. One attractive and notable feature of this book is its price, $3.25. The quality of the paper and binding is not as good as that of the outrageously priced technical books published in this country, but it is not bad either. One hopes that Mir Press will continue to make available such modestly priced translations of Soviet technical books.

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Introduction to the Strong Interactions

N. W. Dean
377 pp. Gordon and Breach, New York, 1976. $34.50

Writing a textbook on such a rapidly expanding field as particle physics is always a dangerous undertaking, since it is almost guaranteed that important new advances will be made by the time the text appears. In reviewing such a book one must be cognizant of this fact and sympathetic to the author, especially during a period such as the one we are now in. We have seen such an explosion of exciting experimental discoveries and theoretical ideas in the past few years that it would be impossible for any book to be up to date. Nevertheless this textbook by Nathan Dean has to be faulted for being especially antiquated. The subject matter treated is that of strong interactions, but the discussion is straight from the 1960's.

The restriction of material to strong interactions is justifiable; even if it does automatically exclude some of the most exciting recent developments (such as neutrino physics and unified theories of weak and electromagnetic interactions), it still leaves plenty of room for a pedagogically and thematically satisfying volume. One must insist, however, that a modern textbook at least make some introductory remarks about quantum chromodynamics, charm, and the parton model, topics that are nowhere mentioned in this book. The publisher must share part of the blame; although this text has a 1976 copyright, it seems to have taken a long time to appear and was actually written before the discovery of the J/ψ particles. The dated nature of the book extends beyond the lack of discussion of the "new" physics. Even in the area that the book is most at home, Regge theory and analyticity, it is at least seven years

out of date. Dean does not treat the important generalized optical theorem of Mueller and its immensely successful applications to inclusive reactions. This volume is based on lectures that the author gave in the mid- to late-1960's and unfortunately is true to its origins.

This shortcoming of the book is even more regretable when one sees how well Dean does discuss the material that he has included. The book begins with an excursion into group theory, introducing the student to SU_3 by first passing through the more familiar territory of rotations and isospin. Dean presents a very fine introduction to the quark model, including most of what a non-expert needs to know about spin and SU_6. The discussion of SU_N groups is sufficiently detailed that the student should have little trouble extending to SU_4 and beyond, what has been learned about SU_3.

Part II of the text concerns itself with analyticity. One feature that I found especially gratifying was the clear treatment of bound states and resonance poles. The last part of the book considers Regge theory and briefly touches upon such arcane topics as sense and nonsense, conspiracy and evasion. Even here the author's style is light and clear.

The material treated is always treated well, and I found the book a better introduction to the subject than other existing texts, for example, R. J. Eden's *High Energy Collisions of Elementary Particles* (Cambridge U.P., 1975). If a student is interested in this particular aspect of strong interactions, I would recommend Dean's book, but for a general introduction I would search for a much more up-to-date one.

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Mathematical Modeling and Digital Simulation for Engineers and Scientists

J. S. Smith
322 pp. Wiley-Interscience, New York, 1977. $21.00

In this book J. M. Smith describes numerical procedures for solving continuous and discrete processes. The first chapter contains background information that makes the book readable to large classes of people without an engineering background. It includes a discussion of linear ordinary differential equations with many examples included. Beyond the standard theory one is introduced to the whole notion of a frequency domain and the use of Fourier and Laplace transforms. This chapter in particular is well written with many examples and illustrations. The use of block diagrams and transfer functions are described in detail.

In the second chapter the ideas of the first chapter are extended to difference equations rather than differential equations. The discussion of the various types of errors is slightly confusing as it is never precisely defined. The fundamental use of the Z transform is introduced in this chapter, and tables are included for the Z transform of many common functions. Applications to discrete systems are given.

The heart of the book, the numerical solution of ordinary differential equations, begins in chapters three and four. The former concerns itself mainly with the concept of stability. One defect is that the description is mainly by examples and no general definitions are given, thus making the extension to systems of equations harder to follow. In the following chapter both discrete and hybrid approximations are considered and the important phenomena of aliasing is introduced. Then difference approximations to the continuous differential equations are introduced based on the Z transform. As before, extensive diagrams help ease the reader through the various