



Spacetime, Geometry and Gravitation. Pankaj Sharan. Hindustan Book Agency (India), P19 Green Park Extension, New Delhi 110 016. 2009. xiv + 355 pp. Price: Rs 550.

There are a large number of text books on gravitation (GR) and yet almost every couple of years a new book comes. I have always been wondering what is then the motivating factor which directs one to make one more addition in the already existing large body? I think there are perhaps two kinds of considerations. One, after working and teaching a subject over a period of time, one develops one's own new perspective which one would like to share and two, one has organized a course in a manner he/she considers, though not very new and original, reasonably effective and efficient. The book under review intends to fall in the second category.

The book is divided into three parts as indicated in the title in that order. The first part has four chapters devoted to introduction, curvature, geodesics and discussion of Schwarzschild solution and planetary orbits. The discussion is supposed to be free of mathematical details like solving the Einstein equation to obtain Schwarzschild solution and is supposed to focus on the physical aspects. Here I am struck by eq. (4.13) for effective potential on page 69 and its plot in figure 4.1 on the following page. It does not include the rest energy of the particle which is an essential part of relativistic equation and that makes energy always >0 . The author claims this equation to be an exact result in GR.

The second part has six chapters on geometry in great details. This is a comprehensive part of the book which could have been perhaps a good book in itself.

The third part consists of six chapters spanning through energy momentum tensor for matter and field, action principle, Penrose diagram, weak field approximation, gravitational waves, Schwarzschild and Kerr solutions and their extensions, cosmology and some special topics. All the solutions are assumed and Einstein equation does not seem to have been solved even to obtain the quintessence Schwarzschild solution.

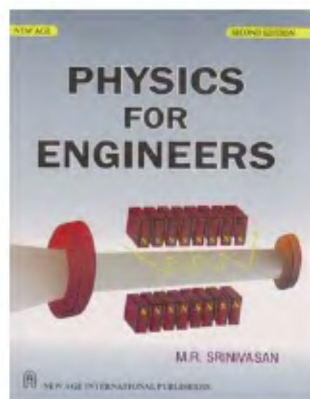
Cosmological application of GR is by far one of the most exciting things which has a share of bare eight pages in over 350 pages. The book seems to be uneven in its sense of priority in relation to the significance of the physically interesting topics.

The book has a large number of exercises and tutorial sessions, some of which are interesting.

I think the second part on geometry seems to be the strength of the book. However, eq. (4.13) and figure 4.1 need urgent correction.

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Physics for Engineers. M. R. Srinivasan. New Age International (P) Limited Publishers, 4835/24, Ansari Road, Daryaganj, New Delhi 110 002. 2009. xii + 736 pp. Price: Rs 395.

An illuminating feature of *Physics for Engineers* is the number of applications that it presents in various fields. Many of these applications are exciting and reflect some of the state-of-the-art technologies. Although this book is not intended for

rigorous study of physics, the author has made an effort to describe various concepts with mathematical detail that is palatable, and occasionally, somewhat challenging to the intended readers of this textbook.

The first chapter on 'Vibrations and Resonance' considers in detail various cases in free and forced vibrations of a single degree-of-freedom linear oscillator. Basic concepts in resonance such as quality factor and bandwidth are presented. Basic principles behind vibration isolation and vibration absorbers are discussed. The second chapter on acoustics starts with a brief account on reflection, refraction and absorption of sound. Absence of sound shadow due to diffraction is well illustrated. Basic concepts on acoustics of enclosed space such as reverberation are discussed. Sabine's and Eyring's formulae for reverberation time are presented. Different kinds of sound absorbers including Helmholtz resonator for frequency specific absorption are discussed. The later part of the chapter deals with design issues in acoustics for an auditorium. Important concepts covered in the chapter on ultrasonics include wave mode conversion between shear and longitudinal waves, Bragg's diffraction, Raman-Nath diffraction and Doppler's effect. Ultrasonic wave generation by making use of piezoelectric effect, magnetostrictive effect and laser pulsing is presented. Electromagnetic acoustic transducer based on Lorentz force on a conductor carrying current is described in detail. A brief account on mechanical ultrasonic generators such as a siren is noteworthy. Many applications of ultrasonics including ultrasonic imaging are described lucidly.

The chapter on 'Interference and Diffraction' includes most of the traditional material: superposition of waves, Young's double slit experiment, Fresnel's Biprism, interference in thin films, Newton's rings, Michelson's interferometer, Fraunhofer diffraction, diffraction grating and Rayleigh's criterion for resolving power. The reasons for high-resolution of electron microscope and magnetic lens used in electron microscope have been explained well. The chapter on polarization of light is concise and is well presented. It describes obtaining polarized light by reflection (and associated Brewster's law), Nicol prism and Polaroid films. The concept of elliptic polarization is well illustrated. Photoelasticity is a