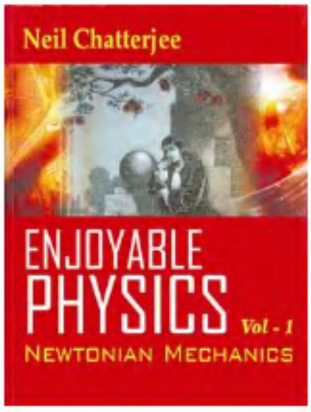


Enjoyable Physics: Newtonian Mechanics, Vol. 1. Neil Chatterjee. Macmillan Publishers India Ltd, 2/10 Ansari Road, Daryaganj, New Delhi 110 002. 2009. 843 pp. Price: Rs 525.

Physics is much more than merely deriving equations, and solving numerical problems. Thus students certainly need orientation in this direction, making it more enjoyable. To cite an example from my own experience during my college days: while attempting to solve problems in statics and mechanics, once the vector diagram was drawn, resolving all the forces acting, formulating the equations applying equilibrium condition and assigning directions to resolved forces, and then solving these equations for the answer was confusing. The students considered this too long a process to try especially in the examination and so lost interest in such topics. Questions such as: 'why all forces have to be resolved first and combined again? or why normal forces are always considered although they have zero effect?' do not arise in the minds of students. This is because the implications of the concepts and methodologies of practising physics in practical applications are not addressed either while teaching or in textbooks. Such being the reality in our 10 + 2 and undergraduate education, the author is well justified in writing the enjoyable physics book series to encourage students to spend time on 'thinking about physics', rather than 'simply doing it'. This will enable the students not only to think about deeper issues in physics and their implications, but also to be creative in attempting challenging physics problems. This book develops in a systematic manner, the linkages between concepts of mechanics and practical applications to challenging and brain-teasing problems. The author has done a remarkable job in collecting a variety of problems on the Newtonian and frontiers of modern mechanics.

The book appears to be the spin-off the author's long experience in teaching and training young aspiring minds for admission into prestigious institutions (IITs, NITs) of the country. Though the style of the book is too elaborate, the matter as such is clear and lucid. The conceptual development and method of solving problems with entertaining examples are of high standard. It is a reader-friendly approach that the author has employed with so much of real-life examples brought into practical physics problems, but still keeping faithful representations of scientific concepts/laws/principles and their applications.

My journey through the book has been a mixed experience. At first glance it appeared to be a bulky book with long explanations. Later I derived inspiration from description of the concepts taking real-life physical problems with supporting illustrations, problem-solving approaches and brain-teasing questions at the end of each chapter. Beginning with the foundation stones of physics such as measurements, units, dimensions and vectors, the book makes a journey through all topics of Newtonian mechanics and ends up with a historical background of gravitation and Space application-related problems. Though I have read the book only once, it seems to be free from errors.

The material of the book is organized in 11 chapters printed in over 800 pages, complemented by attractive illustrations, puzzles, brain-teasing questions, solved exercises and a large number of unsolved exercises and challenging problems. Chapter 1 prepares the reader with the basics of measurement of physical quantities, units and dimensions followed by chapter 2, which introduces vectors that would be needed later. The other chapters are developed like building blocks covering the entire Newtonian mechanics. Although all chapters are given equal weightage in terms of explaining concepts, illustrations, exercises and problems, two topics particularly attracted my attention. One is chapter 9 on rotational mechanics and the other is the last chapter (chapter 11) on gravitation. My experience is that, generally rotational mechanics is difficult for the young minds to understand. The author has made this topic simple to understand with many illustrations, explanations and clear vector diagrams. Specifically the worked-out examples and exercises (pp. 584–632) indicate the capability of the book in making the topic easy to understand. Similarly in chapter 11, after a brief history about gravitation, the subsequent gravitational related concepts are explained in a clear and attractive fashion. Specifically students are attracted to attempt some relevant problems (like no. 48 on p. 803). This chapter is well supported with relevant space application-related problems, suited for those aspiring to take up a career in aerospace engineering and aeronautics (pp. 776–786). These solved examples help understand how the concepts of mechanics are applied in the modern Space technology.

Keeping the student community and academic competition in mind, the author has also taken great care to include multiple-choice questions, short-answer questions, a large number of examples, tutorial exercises with hints and an equally large number of problems with answers at the end of each chapter. Also, each problem is graded with the level of difficulty which helps the reader realize his level of understanding and problem-solving capability. This aspect and the surplus miscellaneous notes with practical examples in each chapter obviously enhance the utility of the book. The appendices included at the end of the book are impressive. This can be a quick reference for physical symbols, constants, conversion table, trigonometric identities, formulas, mensuration, periodic table, etc. which are frequently required while solving problems. Interestingly, the author himself has mentioned about the features of the book in the beginning and also on the back cover page.

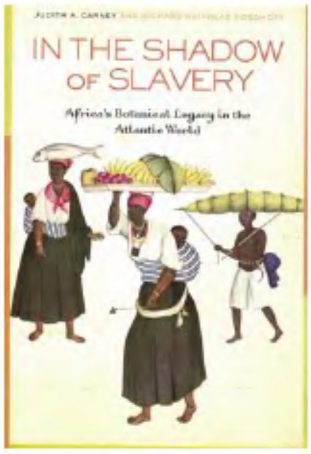
In general one notes that this is a complete book on Newtonian mechanics giving equal level of treatment on all related topics in an explicit and clear fashion with several illustrations and practical examples. However, as a textbook it appears too bulky when considered for one topic in physics. A book of this size normally covers all topics on the fundamentals of physics and there are plenty such books available. Hence the size and the price may discourage individuals (students/teachers) from buying the book just for one topic, but it would definitely be a useful addition for libraries. This slightly high priced book is sure to find a

prominent place in college and university libraries and in the book collection of those who enjoy practising physics. Definitely this book is comparable to the best ones on physics of similar standards. Also, the author is in the process of writing similar books on other topics of physics. Hope these will help attract the young students into many classical domains of physics.

Although the book is addressed to students taking IIT-JEE and pursuing undergraduate course in physics, I would strongly recommend it to all students of physics, whether undergraduate/postgraduate or research student, and also to all practising physicists, whether a physics teacher or researcher who wants to enjoy physics.

G. M. HEGDE

Centre of Excellence in Nanoelectronics,
Indian Institute of Science,
Bangalore 560 012, India
e-mail: gopal.hegde@gmail.com



In the Shadow of Slavery: Africa's Botanical Legacy in the Atlantic World. J. A. Carney and R. N. Rosomoff. University of California Press, Berkeley, CA, USA. 2009. xvi + 280 pp. Price: US$ 27.50.

This book under review is written in the context of the agricultural legacies brought to the New World by the slaves and their trade. This trade has been one of the darkest chapters of human history, comparable in horror and intensity to the Holocaust. The only difference has been in their durations. While the former lasted for more than three centuries, the Holocaust lasted for only more than three decades. But, both the events are estimated to have claimed 11–17 million people.

Slavery among the humans has been as old as their trade and commerce. It was rare among the hunter-gatherers, since slavery is dependent on a system of social stratification. Thus, it was known to be prevalent in the ancient kingdoms of Sumer, ancient Egypt, Assyria, ancient Greece, the Roman Empire, and so on.

The trans-Atlantic slave trade has been the best known among them. This started in early 16th century, after Christopher Columbus discovered the New World in 1492, and continued almost till the end of the 19th century. The initiation of commercial trade by the Europeans (Portuguese, Dutch, Spaniards, British and French) with west Africa from about 1440, provided one of the two engines to initiate slave trade.

The second was the demand for labour to set up new colonies in the Americas. With the discovery by Columbus, began a steady wave of emigration of Europeans to the New World. It reached a peak in the 18th and 19th centuries. The new settlers wanted labour to set up homes, clear land and take up plantations, initially to feed themselves, and thereafter, for exporting commodities to Europe. The export items consisted predominantly of sugar (from sugarcane), cotton and tobacco. Most of the slaves came from west and central Africa, both predominantly tropical regions. Various estimates have put the number of slaves taken to the New World between 10 and 20 million. The human costs of the trade used to be high. About 50% of the total number is estimated to have died up to the first year of their landing in the new continent – about 5% while awaiting shipment, 15–20% at sea on board the ships, and the rest in their first year. The people – both men and women – used to be taken by force, then kept captive in the west African ports in barracks awaiting their sale to agents, who would then buy and transport them across the Atlantic Sea and sell them in the Americas. The life of the slaves used to be harsh, food and water always in short supply, both on land and on-board, and their treatment at the hands of their masters, generally cruel. The slave labourers were not permitted to carry any belongings with them; if they did, they consisted of smuggled items.

The voyages across the Atlantic used to take 6–10 weeks, a ship would carry up to 700 slaves and 50 crew. The ship would first sail from Europe to west Africa carrying goods, which they would trade for slaves and then set sail from west Africa, usually northwards to the Azores and then westwards across the Atlantic Ocean to the West Indies, the continental North America, and more than one-third of them to South America, mainly to Brazil and the Guineas. The ship had to provision for more than 700 persons for about 10 weeks. It used to take up to four weeks in the African port of call to assemble the required number of slaves and provisions. Food used to be served only twice, and always in limited quantities, and the slaves used to be kept in chains to restrain them from mutinying or jumping overboard to commit suicide. Life on-board was hard and this would explain the 10–20% human losses during the Middle Passage (the sea journey of slave ships from west Africa to the West Indies). The food articles that were left over used to be downloaded and the ships fully cleaned at the final port of call in the New World. This unintentionally became one of the modes of dispersal of plants to the New World. Even after their sale in the New World, the life of the slaves used to be one of privation and hard labour. The rations supplied to them used to be insufficient and monotonous (mostly corn-flour paste); it was to supplement this that the African slaves had to use their ingenuity, skill and labour for food production.

It is in this setting that the authors of this book had set out to chronicle the lives and struggles of the African slave labour. After reading the book, I am left with the impression that to do justice to the contents of this book, the subtitle could have been the real title of the book. But, commercial interests emanating from a broader interest in slave trade might have deterred the authors from doing this.

In this original and ground-breaking book, the authors have drawn on archeological and historical records, oral histories, and accounts of slave-ship captains, traders and travellers to craft a detailed account of the lives, travails and invaluable contributions made by the slaves to the economies and ethnobotany of the American continent.

The authors have shown that the many familiar crops of the Americas – millets,