deficient neurogenesis in AD patients and a possible role of GSK3 in this deficit. Zeidan-Chulia and Moreira review the Wnt/β-catenin signalling and critically analyse the validity of inhibiting GSK3β in the disease.

The importance of Tau as a dynamic regulator of microtubules in maintaining neuronal shape and functionality is well established. Alternative splicing of Tau and the uncontrolled post-translational modifications (hyper-phosphorylation, glycosylation, prolylamide bond isomerization, oxidation, etc.) lead to tauopathies, including AD. The most prospective therapeutic avenues targeted against these pathologically driven steps are presented and critically discussed by Seneci. Each target is presented together with its known small-molecule modulators.

Despite the progress in research in drug discovery, the effective pharmacotherapy in AD remains restricted due to the presence of physiological barriers like BBB, blood–cerebrospinal fluid barrier and p-glycoproteins. In this regard, Ahmad *et al.* aptly describe the emergence of nanotechnology-based drug delivery, targeting and localized delivery by means of nanomedicines. Further, they illustrate the AChE drug-loaded nanomedicines for management of AD, the clinical relevance and the challenges associated with their bioavailable brain delivery.

Overall, the book describes the current molecular understanding of AD condition, existing drugs, and recent advances in the field of AD therapeutics. However, the flip side is the repetitiveness of information on inhibitors of AChE and BACE-1 in a good number of chapters. Nevertheless, with the comprehensive coverage, this book would be useful as a reliable source of review of the literature for experimental neuroscientists and clinicians in the field of drug discovery for AD. Other neuroscientists who wish to have a quick summary on the current status of anti-AD drug design would find this compilation useful.

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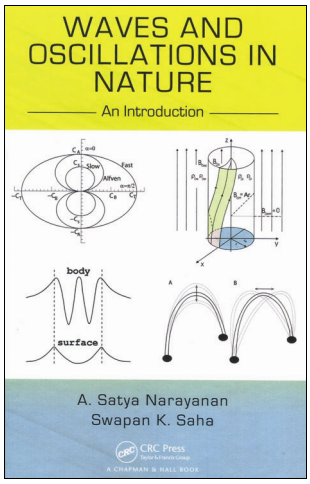

Waves and Oscillations in Nature: An Introduction. A. Satya Narayanan and Swapan K. Saha. CRC Press, Taylor & Francis Group, 6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742, USA. 2015. xxix + 521 pages. Price: £ 65.99.

Natural phenomena are dominated by the occurrence of oscillations and waves, whether it is light propagation, water wave disturbance, magneto hydrodynamics or plasma oscillations. There are many common features encompassing wave propagation and oscillatory behaviours in these diverse systems. Any attempt to consider these common features comprehensively, as has been done in this book, is a welcome contribution to physics literature. In addition, these waves and oscillations can behave linearly or nonlinearly, covering quite different aspects. This book covers these aspects essentially in the linear regime in electromagnetic and optical wave propagation, uniform and nonuniform media, hydrodynamics, magneto hydrodynamics and plasmas, though the nonlinear aspects are touched upon occasionally in a cursory manner. Overall, the book encompasses a wide variety of wave and oscillatory phenomena in diverse areas of physics, though there are a few shortcomings (which can always be addressed in a subsequent edition) which I will point out towards the end.

The book consists of 10 chapters. To start with, a comprehensive discussion on the basic notions of waves and various aspects of electromagnetic waves (including phase velocity, group velocity, dispersion relations and classifications, and spectrum, interference and diffraction phenomena) is given in chapter 1. In particular, the diffraction phenomenon is discussed exhaustively and the notion of resolving power of a telescope is clearly spelt out. Chapter 2 contains a nice discussion on the physical and mathematical aspects of electrostatics, magnetostatics, time-varying fields and Maxwell's equations in free space, which any student of physics will enjoy. This is followed by a rather careful analysis of wave propagation generated from a source through an antenna and its ramifications, including radio astronomy. The chapter ends with a short but penetrating analysis of waves through the ionosphere and determination of time through appropriate measurements on Earth, for example, by the National Physical Laboratory, New Delhi.

Chapter 3 contains a brief discussion on the general aspects of linear waves in uniform media, followed by a short discussion on nonlinear waves, namely solitary waves and soliton solutions of the Korteweg–de Vries (KdV) equation. Simple harmonic motion, damped and resonant motions and linearly coupled oscillators are discussed as well as propagation of waves in systems modelled by linear wave equation and Helmholtz equation, and longitudinal wave propagation, though the motivation for all these discussions is not made clear. Finally, the KdV equation is introduced (but again the purpose is not spelt out clearly) and the idea behind the introduction of the linear eigenvalue problem (3.159) is hazy (that is, there is no mention of the associated linear time-evolution equation and how by the requirement of compatibility condition for the KdV is deduced). Similarly, the discussions on nonlinear Schrödinger (NLS) equation and two-soliton solution of KdV (Sec. 3.11.2) are rather incomplete. There are many latest books available on these aspects, including those by Indian authors, and they could have been referred here.

Hydrodynamic waves (that is, waves in fluids, both liquids and gases) are investigated in chapter 4. The chapter mostly concentrates on waves in incompressible fluids, including small-amplitude waves, linear capillary and gravity waves, and surface waves. The notion of shallow water waves (that is, the depth of the water layer being smaller than the wavelength) is analysed in some length, including nonlinear effects. Some examples in geophysical fluids (like Poincaré, Kelvin and inertial waves), and Rayleigh, Lamb and Rossby waves in hydrodynamics are also discussed. This chapter also includes useful

derivation of Klein–Gordon, Boussinesq and finally KdV equations for appropriate hydrodynamic situations.

Chapters 5 and 6 deal with magneto hydrodynamic (MHD) waves in uniform and nonuniform media respectively in some depth. When considering waves, the main restoring forces are (i) gas pressure, (ii) gravity and (iii) magnetic fields. Depending on the nature of the forces which act at equilibrium of a gas, the resulting characteristic oscillation/mode is designated as sound, internal gravity waves or Alfvén waves. In this chapter, under uniform forces, the effect of magnetic fields along with other forces is given a critical treatment. Different types of Alfvén waves under the action of gravity, magnetic field and mixing, and the associated linear dispersion relations are analysed exhaustively. Toward the end, nonlinear behaviour of driven MHD waves in the slow wave dissipative layer is briefly discussed. In chapter 6, the propagation of MHD waves in nonuniform media, where discontinuities in the magnetic field, density and pressure with finite geometries are allowed, is investigated in detail. Nonlinear evolution equations such as the KdV, Benjamin–Ono and Burgers equations are also briefly introduced.

There exist several physical situations in areas like MHD, space plasmas and gas dynamics where pressure develops a discontinuity, and in the absence of dissipative effects like viscosity and heat conductivity, propagation and convection of compressional disturbances lead to continual steepening of waveforms which ultimately can no longer be expressed by single-valued functions of position. Shock waves like sonic booms which are discontinuities in the flow variables are formed and propagate, and these are dealt with in chapter 7. Different types of shocks, waves in a polytropic gas, MHD and collisionless plasmas are analysed in greater detail. Burgers and KdV equations are discussed to consider the nonlinear effects.

Next follows a comprehensive discussion on optical waves, essentially in the linear domain. Classical and modern optics, and mathematical representation of nonmonochromatic fields are introduced. Coherence length and coherence time are discussed. Then follows a detailed discussion of polarization of plane monochromatic waves, including polarization ellipse, Stokes parameters and intensity formula, Jones matrix, Mueller matrix, rotated polarizing elements, elliptical and circular polarizer and analyser and finally polarimeter, including astronomical polarimeter.

Chapters 9 and 10 deal with plasma waves and their stability aspects respectively. Starting from the notion of plasma, the parameters like Debye shielding, plasma frequency, etc. are introduced in chapter 9. Then comes a detailed discussion on electrostatic waves in magnetized plasmas, waves in a cold plasma, Langmuir waves, ion acoustic waves and waves in nonhomogeneous plasmas. Finally some aspects of nonlinear waves, including ion-acoustic solitons and NLS equation are briefly discussed. In the last chapter, the question of linear stability of various waves discussed earlier, particularly in chapter 9, under perturbations (both small and finite) to check whether they are stable or unstable is analysed. Stability of parallel shear flows, Rayleigh–Taylor instability, Kelvin–Helmholtz instability, parametric instability, two-stream instability, interchange instability, sausage instability, kink instability and balooning instability are all discussed systematically. There are also two Appendices, the first one is a summary of important formulas and the second is on vector operators.

The book is obviously a nice compendium of different aspects of linear wave propagation and oscillation. People working in the area will be pleased to see such a comprehensive consideration in a single book. In spite of these welcome features the book is poorly proof-read and there are numerous obvious errors throughout. However, I do not list them here.

From a technical point of view, in my opinion the discussion on nonlinear waves is poorly made. KdV equation is introduced at many places as well as its linear eigenvalue problem (without introducing necessary boundary conditions), but no mention is made on the time-evolution part which is again a linear problem so that the compatibility condition between the two linear problems leads to the KdV equation. While two-soliton solution is introduced (without discussing the time-evolution part), nowhere the properties of solitons are discussed in any meaningful way. So also, the envelope soliton properties of NLS equation are not discussed.

By the way, what the authors' call Zakharov–Shabat equation (eq. (9.120)) is actually the nonlinear cubic Schrödinger equation (eq. (3.193)). Incidentally it is not clear why a term $a_2\, u\, |u|^3$ is added in the latter. Also in eq. (9.119), if the average amplitude A_0 is constant, it is equivalent to the NLS equation through a gauge transformation. It is not clear why Bäckland transformation is introduced under Burgers equation. It will be more meaningful to discuss it under KdV or NLS equation. I feel that the best procedure to discuss the properties of nonlinear waves in this book would have been to introduce the concerned equations wherever they occur in different chapters and then discuss their solution/properties at a single place on their first occurrence or in an Appendix. Also, the discussion on the solutions and properties of nonlinear waves requires more critical analysis, even if it is short.

In spite of the criticisms, this book is an admirable addition to the study of wave propagation and oscillation, which every researcher in physics would like to have.

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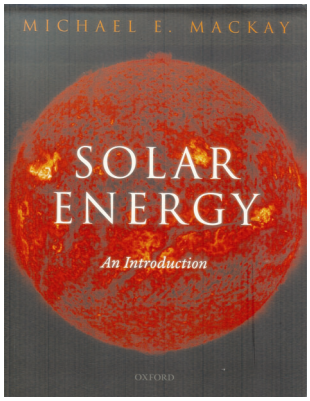

Solar Energy: An Introduction. Michael E. Mackay. Oxford University Press, 198 Madison Avenue, New York 10016, USA. 2015. xv + 240 pages. Price: £27.50.

This book is well-timed because of current interest in green and renewable energies for generating electricity. It attempts to cover the entire gamut of topics starting from how energy is generated on the Sun, all the way up to solar photovoltaic and thermal applications. It is a daunting task to cover all the important aspects of solar energy. The author, must