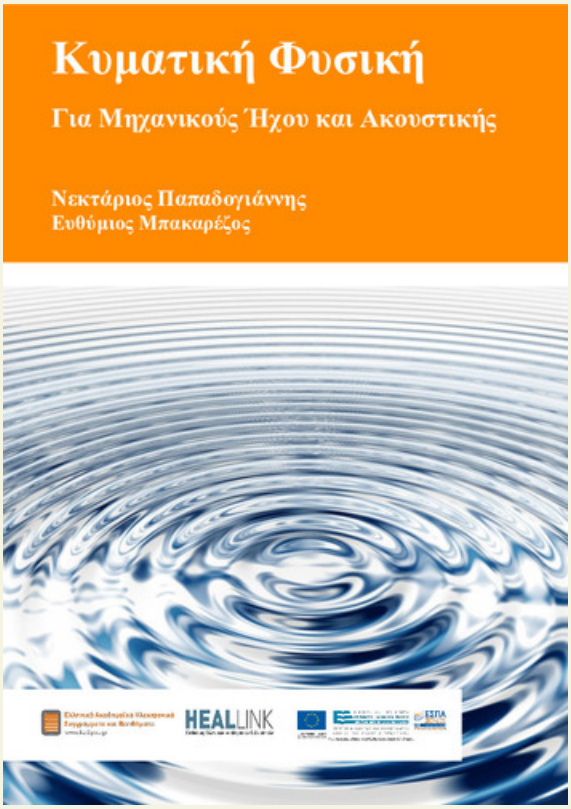

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Abstract

The aim of this book is to introduce the basic concepts of wave physics with examples, applications and laboratory exercises. These concepts are essential at the introductory undergraduate level of Departments of sound engineering and acoustics and, broadly, Departments involved in music technology and the sound arts. The first chapters introduce the concepts of kinetic and dynamical body theory using basic principles of calculus. Then the basic principles of periodic motions, simple harmonic oscillations, their superposition in one and two dimensions, damped and forced oscillations and the phenomenon of resonance, are presented. Then an introduction to wave physics is given with the definition, the basic physical quantities of waves and the basic types of wave perturbations. The concepts of the wave equation for one-dimensional waves, their velocity, energy and power are introduced.

The concepts of normal modes of oscillation and characteristic frequencies (eigenfrequencies) are also introduced. This is followed by an analysis of basic wave phenomena involving wave superposition and wave interference, Fourier wave analysis, standing wave generation and resonance, the study of waves in a bounded string, and the Doppler effect. For the particular case of sound waves, the concepts of displacement waves and acoustic pressure waves, their supeposition in tubes and membranes, the types of sound waves in terms of source and propagation symmetry (plane, cylindrical and spherical) in free space are presented and the concept of sound intensity and the decibel (dB) intensity scale are introduced. Finally, complete examples of laboratory exercises based on commercially available equipment are given, which aim at understanding the aforementioned concepts.

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