

Preface

Thermal wave is a term widely used to denote the temperature field originated in a sample or its closest environment due to the action of time varying (pulsed or periodical) heat sources. The thermal waves analogy with true oscillating wave fields have allowed the widely use of their concept for the explanation and interpretation of many physical experimental situations, such as those present in the so-called photothermal phenomena and techniques. This book is devoted to give an inside in the physical formalism behind the thermal wave concept (Chapter 1) and to explain some of its recent applications in the context of the photothermal techniques from basic principles, the presentation of different useful photothermal methods, to applications in semiconductors, material sciences, biophysics, foodstuffs, and environment, among others.

Thermal wave physics has fulfilled its expectative, since its rediscover in the second half of the past century, although novel developments deserve special attention. Pyroelectric detection schemes, in particular, are extremely attractive, as will be demonstrated in the chapters 2 to 5, because its capabilities to perform thermal properties measurement and to monitoring dynamic processes, among others. The ancient Photoacoustic Spectroscopy technique has also encountered novel applications concerning transport properties determination in semiconductors (chapter 6), but also promissory are its capabilities to follow dynamic processes, to characterize biomaterials and to detect low levels of contaminants or impurities in gases (chapters 7 to 9). Remote detection schemes have been also extended the field of their applications. The capabilities of infrared thermography to thermophysical and mechanical characterization will be reviewed in chapter 10, and chapters 11 and 12 will be devoted to describe the analytical possibilities of thermal lens spectroscopy.

As the book deals with both theoretical aspects and experimental approaches and as it reviews some recent developments and applications, it should be of interest to scientists who wish to carry out theoretical or experimental research in this field, as well as to students and teachers requiring a solid formation in this area.

I am glad to express my deep gratitude to the authors of the different chapters for providing contributions in their respective fields of expertise and for their enthusiasm and dedication to the project. I very acknowledge the partial support of SIP project 20080032 and COFAA, both from IPN-México, and CONACyT-México, during different stages of writing and editing of the manuscript. I am also thankful to my colleagues A. Calderón, Coordinator of the *Postgrado en Tecnología Avanzada* of CICATA-Legaria, IPN, México D.F. and J.A.I. Díaz-Góngora, Director of CICATA-Legaria, for their support and understanding during the edition of this work. Last, but not least, I am grateful to my family for their presence, comprehension and infinite patience. I dedicate this book to my son.

México

Ernesto Marín Moares

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Editor

Ernesto Marín Moares

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