



## BOOK REVIEW

*Pseudo-Riemannian Geometry,  $\delta$ -Invariants and Applications*, by Bang-Yen Chen, World Scientific, Singapore, 2011, xxxii + 477 pp., ISBN 978-981-4329-63-7.

The new book by Bang-Yen Chen, Professor from the Michigan State University is aimed to provide an extensive and comprehensive survey on pseudo-Riemannian submanifolds and the so-called  $\delta$ -invariants, introduced by the author in the early 1990s, as well as on their applications. The book is both a good introduction to the theory of pseudo-Riemannian submanifolds and  $\delta$ -invariants and a very useful reference to recent results in these areas, which have great value both within mathematics as well as in other natural sciences. Reading this book the readers will deepen their understanding and improve their appreciation of the concepts and theories under discussion.

The book consists of twenty chapters and can be divided into two parts. The first part, containing Chapter 1 through Chapter 12, provides an introduction to the subject of pseudo-Riemannian manifolds and their non-degenerate submanifolds, assuming from the reader some basic knowledge about manifold theory.

In Chapter 1 the author introduces the notion of a pseudo-Riemannian manifold and the basic notions regarding pseudo-Riemannian manifolds such as an affine connection, the Levi-Civita connection, parallel translation along a curve, geodesics, Riemannian curvature tensor, sectional, Ricci and scalar curvatures. Some basic propositions and theorems involving these notions are proved. The author reveals the physical interpretation of pseudo-Riemannian manifolds pointing out that spacetimes are the arenas in which all physical events take place. He explains the differential geometric viewpoint of the Kaluza-Klein theory and the use of higher dimensional pseudo-Riemannian manifolds, which lead to many new developments in string theory.

Chapter 2 is devoted to pseudo-Riemannian submanifolds. It starts with isometric immersions, the Cartan–Janet’s and Nash’s embedding theorems, continues with the Gauss’ formula, the second fundamental form, the Weingarten’s formula, the fundamental equations of Gauss, Codazzi and Ricci and the fundamental theorems of existence and uniqueness for pseudo-Riemannian submanifolds. In this chapter