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The ISFMA-CIMPA School on "Differential Geometry: Theory and Applications" was held on 07 August - 18 August 2006 in the building of the Chinese-French Institute for Applied Mathematics ISFMA, Fudan University, Shanghai, China. This school was jointly organized by the ISFMA and the CIMPA International Centre for Pure and Applied Mathematics, Nice, France. About sixty participants from China, HongKong, France, Cambodia, India, Iran, Pakistan, Philippines, Romania, Russia, Sri-Lanka, Thailand, Turkey, Uzbekistan and Vietnam attended this highly successful event. The first objective of this school was to lay down in a self-contained and accessible manner the basic notions of differential geometry, such as the metric tensor, the Riemann curvature tensor, the fundamental forms of a surface, covariant derivatives, and the fundamental theorem of sur-face theory etc. Although this field is with good reasons often considered as a "classical" one, it has been recently "rejuvenated", thanks to the manifold applications where it plays an essential role. The second objective of this school was to present some of these applications, such as the theory of linearly and nonlinearly elastic shells, the implementation of numerical methods for shells, and mesh generation in finite element methods.

To fulfill these objectives, four series of lectures, each series compris-ing ten 50min-lectures, were delivered under the following titles: "In-troduction to differential geometry", "Introduction to shell theory", "A differential geometry approach to mesh generation", and "Numerical methods for shells". This volume gathers the materials covered in these lectures. As such, this volume should be very useful to graduate students and researchers in pure and applied mathematics. The organizers take pleasure in thanking the various organizations for their generous support: The ISFMA, the CIMPA, the French Embassy in Beijing, the Consulate General of France in Shanghai, the National Natural Science Foundation of China, Fudan University, Higher Educa-tion Press and World Scientific. Finally, our special thanks are due to Mrs. Zhou Chun-Lian for her patient and effective work in editing this book.

This book gives the basic notions of differential geometry, such as the metric tensor, the Riemann curvature tensor, the fundamental forms of a surface, covariant derivatives, and the fundamental theorem of surface theory in a self-contained and accessible manner. Although the field is often considered a "classical" one, it has recently been rejuvenated, thanks to the manifold applications where it plays an essential role. The book presents some important applications to shells, such as the theory of linearly and nonlinearly elastic shells, the implementation of numerical methods for shells, and mesh generation in finite element methods. This volume will be very useful to graduate students and researchers in pure and applied mathematics.

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PrefacePhilippe G. Ciarlet: An Introduction to Differential Geometry in R 3Philippe G. Ciarlet, Cristinel Mardare: An Introduction to Shell TheoryDominique Chapelle: Some New Results and Current Challenges in the Finite Element Analysis of ShellsPascal Frey: A Differential Geometry Approach to Mesh Generation

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