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Collana	Lecture notes in earth system sciences
Altri autori (Persone)	SansoF <1945-> (Fernando) SiderisMichael G. <1958->
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Part I: 1. The forward modelling of the gravity field -- 2. Observable of physical geodesy and their analytical representation -- 3. Harmonic calculus and global gravity models -- 4. The local modellling of the gravity field: terrain effects -- 5. The local modelling of the gravity field by collocation.- Part II: 6. Global gravitational Models -- 7. Geoid determination by 3D least squares collaction -- 8. Mass reductions in geoid modelling -- 9. Marine gravity and geoid from satellite altimetry -- 10. Geoid determination by fast Fourier transform techniques -- 11 -- Combination of heights -- Part III: 12. Hilbert spaces and deterministic collacation -- 13. On potential theory and HS of harmonic functions -- 14. A quick look to classical BVP solutions -- 15. The analysis of geodetic boundary value problems (BVP) in linear form.
Sommario/riassunto	Knowledge of the Earth’s gravity field is an essential component for understanding the physical system of the Earth. Inside the masses, the field interacts with many other fields, according to complicated processes of physical and chemical nature; the study of these phenomena is the object of geophysics. Outside the masses, the gravity field smoothes out in agreement with the “harmonic” character of gravitation, while preserving, particularly close to the Earth’s surface, the signature of the internal processes; the study of the gravity field on

the boundary and in the external space is the object of physical geodesy. It is necessary to define a separation surface between the masses and the “free” space. This surface is the geoid, an equipotential surface of the gravity field in a stack of such surfaces, close to the surface of the sea. Determining the geoid, or some other surface closer to the Earth's surface, has become synonymous to modelling the gravity field in physical geodesy; this is the subject of this book. Nowadays, this knowledge has become a practical issue also for engineering and other applications, because the geoid is used as a reference surface (datum) of physical heights that is very important in order to relate such heights to purely geometric ones obtained, for example, from GNSS. The methods currently used to produce the geoid at the centimetre level require significant mathematical, stochastic and numerical analysis. The book is structured in such a way as to provide self consistently all the necessary theoretical concepts, from the most elementary ones, such as Newton’s gravitation law, to the most complicated ones dealing with the stability of solutions of boundary value problems. It also provides a full description of the available numerical techniques for precise geoid and quasi-geoid determination. In this way, the book can be used by both students at the undergraduate and graduate level, as well as by researchers engaged in studies in physical geodesy and in geophysics. The text is accompanied by a number of examples, from most elementary to more advanced, as well as by exercises that illustrate the main concepts and computational methods.