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Nota di contenuto	Contents; 1. Basic electromagnetic theory - A summary; 2. Application of electromagnetic fields of an accelerating charge to obtain the electromagnetic fields of a propagating current pulse; 3. Basic discharge processes in the atmosphere; 4. Numerical simulations of non-thermal electrical discharges in air; 5. Modelling of charging processes in clouds; 6. The physics of lightning flash development; 7. Return stroke models for engineering applications; 8. Electromagnetic models of lightning return strokes 9. Antenna models of lightning return-stroke: an integral approach based on the method of moments10. Transmission line models of lightning return stroke; 11. On the various approximations to calculate lightning return stroke-generated electric and magnetic fields over finitely conducting ground; 12. Propagation effects on electromagnetic fields generated by lightning return strokes: Review of simplified formulas and their validity assessment; 13. Lightning electromagnetic field calculations in presence of a conducting ground: the numerical treatment of Sommerfeld's integrals 14. Measurements of lightning-generated electromagnetic fields15. The Schumann resonances; 16. Lightning effects in the mesosphere and ionosphere; 17. The effects of lightning on the ionosphere/magnetosphere; 18. Interaction of lightning-generated

electromagnetic fields with overhead and underground cables; 19. Scale models and their application to the study of lightning transients in power systems; 20. Attachment of lightning flashes to grounded structures; 21. On the NO_x generation in corona, streamer and low-pressure electrical discharges
22. On the NO_x production by laboratory electrical discharges and lightning
23. High energetic radiation from thunderstorms and lightning; 24. Excitation of visual sensory experiences by electromagnetic fields of lightning; 25. Modelling lightning strikes to tall towers; Index

Sommario/riassunto

The goal of this book is to provide the theory, mathematics and computational tools that are necessary to model each and every one of the processes associated with lightning discharges. This is essential information for a newcomer to the subject as well as for experienced scientists working in this field. Indeed, it is only through exercising various models and mathematical simulations that one can understand the basic mechanisms associated with the generation and interactions of the electric and magnetic fields of thunderclouds and lightning.
