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Nota di contenuto	Cover; Title Page; Copyright; Contents; Preface; Acknowledgments; List of Abbreviations; List of Mathematical Symbols; Part I Models; Chapter 1 Motivation: Earthquake science challenges; Chapter 2 Seismological background; 2.1 Earthquakes; 2.2 Earthquake catalogs; 2.3 Description of modern earthquake catalogs; 2.4 Earthquake temporal occurrence: quasi-periodic, Poisson, or clustered?; 2.5 Earthquake faults: one fault, several faults, or an infinite number of faults?; 2.6 Statistical and physical models of seismicity; 2.7 Laboratory and theoretical studies of fracture Chapter 3 Stochastic processes and earthquake occurrence models3.1 Earthquake clustering and branching processes; 3.2 Several problems and challenges; 3.3 Critical continuum-state branching model of earthquake rupture; 3.3.1 Time-magnitude simulation; 3.3.2 Space-focal mechanism simulation; Part II Statistics; Chapter 4 Statistical distributions of earthquake numbers: Consequence of branching process; 4.1 Theoretical considerations; 4.1.1 Generating function for the negative binomial distribution (NBD); 4.1.2 NBD distribution expressions; 4.1.3 Statistical parameter estimation 6.2 Seismic moment release in earthquakes and aftershocks6.2.1 Temporal distribution of aftershocks; 6.2.2 Southern California

earthquakes and their aftershocks; 6.2.3 Global shallow earthquakes; 6.2.4 Comparison of source-time functions and aftershock moment release; 6.3 Random shear stress and Omori's law; 6.4 Aftershock temporal distribution, theoretical analysis; 6.4.1 Levy distribution; 6.4.2 Inverse Gaussian distribution (IGD); 6.5 Temporal distribution of aftershocks: Observations; 6.5.1 Aftershock sequences; 6.5.2 Temporal distribution for earthquake pairs
6.6 Example: The New Madrid earthquake sequence of 1811-12

Sommario/riassunto

"The proposed book is the first comprehensive and methodologically rigorous analysis of earthquake occurrence. Models based on the theory of the stochastic multidimensional point processes are employed to approximate the earthquake occurrence pattern and evaluate its parameters. The Author shows that most of these parameters have universal values. These results help explain the classical earthquake distributions: Omori's law and the Gutenberg-Richter relation. The Author derives a new negative-binomial distribution for earthquake numbers, instead of the Poisson distribution, and then determines a fractal correlation dimension for spatial distributions of earthquake hypocenters. The book also investigates the disorientation of earthquake focal mechanisms and shows that it follows the rotational Cauchy distribution. These statistical and mathematical advances make it possible to produce quantitative forecasts of earthquake occurrence. In these forecasts earthquake rate in time, space, and focal mechanism orientation is evaluated"--
"Our purpose is to analyze the causes of recent failures in earthquake forecasting, as well as the difficulties in earthquake investigation"--