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Autore	Cozzani Giulia
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Nota di contenuto	Introduction -- Fundamental Concepts Associated with Magnetic Reconnection -- Magnetic Reconnection at the Earth's Magnetosphere -- Methods of Spacecraft Data Analysis.
Sommario/riassunto	This book presents recent advances in the physics of magnetic reconnection, investigated via both in situ spacecraft observations and fully kinetic numerical simulations. Magnetic reconnection is a fundamental process in plasma physics during which the topological reconfiguration of the magnetic field leads to energy conversion and particle energization. The book focuses on the physics of the electron diffusion region (EDR), a crucial region where the electrons are decoupled from the magnetic field and efficiently accelerated by the electric field. By using recent, high-resolution measurements provided by NASA’s Magnetospheric MultiScale Mission (MMS), the book investigates the structure of the EDR at the Earth’s magnetopause. The presented analysis provides evidence for an inhomogeneous and patchy EDR structure. The structure of the EDR appears to be more complex

than the in laminar picture suggested by previous observations and simulations. Then, electrons dynamics in the EDR is studied using a novel, fully kinetic Eulerian Vlasov–Darwin model that has been implemented in the Vlasov–DArwin numerical code (ViDA), explained in detail in the book. Lastly, the book covers the testing of this new code, and investigates the contributions of the different terms in the generalized Ohm’s law within the EDR, highlighting the role of the electron inertia term. This thesis has been nominated as an outstanding Ph.D. thesis by the Laboratoire de Physique des Plasmas – École Polytechnique, Palaiseau, France.