1. Record Nr. UNINA9910143686703321

Autore	Tsimring Shulim E. <1924->
Titolo	Electron beams and microwave vacuum electronics [[electronic resource] /] / Shulim E. Tsimring
Pubbl/distr/stampa	Hoboken, N.J., : Wiley-Interscience, c2007
ISBN	1-280-65449-X 9786610654499 0-470-05376-3 0-470-05375-5
Edizione	[11th ed.]
Descrizione fisica	1 online resource (599 p.)
Collana	Wiley series in microwave and optical engineering
Disciplina	621.3815/12 621.381512
Soggetti	Vacuum microelectronics Electron beams Electronic books.
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references (p. 547-566) and index.
Nota di contenuto	Electron Beams and Microwave Vacuum Electronics; Contents; PREFACE; Introduction; I.1 Outline of the Book; I.2 List of Symbols; I.3 Electromagnetic Fields and Potentials; I.4 Principle of Least Action. Lagrangian. Generalized Momentum. Lagrangian Equations; I.5 Hamiltonian. Hamiltonian Equations; I.6 Liouville Theorem; I.6.1 Liouville Theorem for Interaction Particles; I.6.2 Liouville Theorem for Noninteraction Identical Particles; I.6.3 Liouville Theorem for a Phase Space of Lesser Dimensions; I.7 Emittance. Brightness; I.7.1 Emittance in a Zero Magnetic Field; I.7.2 Brightness I.7.3 Maximum Langmuir Brightness for Thermionic EmittersPART I ELECTRON BEAMS; 1 Motion of Electrons in External Electric and Magnetic Static Fields; 1.1 Introduction; 1.2 Energy of a Charged Particle; 1.3 Potential-Velocity Relation (Static Fields); 1.4 Electrons in a Linear Electric Field e(0)E = kx; 1.4.1 Nonrelativistic Approximation; 1.4.2 Relativistic Oscillator; 1.5 Motion of Electrons in Homogeneous Static Fields; 1.5.1 Electric Field; 1.5.2 Magnetic Field; 1.5.3 Parallel Electric and Magnetic Fields; 1.5.4 Perpendicular Fields E and B

1.5.5 Arbitrary Orientation of Fields E and B. Nonrelativistic Approximation1.6 Motion of Electrons in Weakly Inhomogeneous Static Fields; 1.6.1 Small Variations in Electromagnetic Fields Acting on Moving Charged Particles; 1.6.2 Adiabatic Invariants; 1.6.3 Motion of the Guiding Center; 1.7 Motion of Electrons in Fields with Axial and Plane Symmetry. Busch's Theorem; 1.7.1 Systems with Axial Symmetry. Busch's Theorem; 1.7.2 Formation of Helical Trajectories at a Jump in a Magnetic Field; 1.7.3 Systems with Plane Symmetry; 2 Electron Lenses; 2.1 Introduction
2.2 Maupertuis's Principle. Electron-Optical Refractive Index. Differential Equations of Trajectories2.2.1 Maupertuis's Principle. Differential Equations of Trajectories; 2.2.2 General Properties of Charged-Particle Trajectories in Electromagnetic Fields; 2.3 Differential Equations of Trajectories in Axially Symmetric Fields; 2.4 Differential Equations of Paraxial Trajectories in Axially Symmetric Fields Without a Space Charge; 2.5 Formation of Images by Paraxial Trajectories; 2.5.1 Linearization of Trajectory Equations; 2.5.2 Rotation of an Image. Stigmatic Imaging. Image Similarity
2.5.3 Magnifications2.6 Electrostatic Axially Symmetric Lenses; 2.6.1 Classification of Electrostatic Lenses; 2.6.2 Immersion and Unipotential Lenses; 2.6.3 Cardinal Elements of a Lens with Limited Field Extent; 2.6.4 Focal Length of Thin Unipotential and Immersion Lenses; 2.6.5 Aperture Lenses; 2.6.6 Applications of Cathode Lenses; 2.7 Magnetic Axially Symmetric Lenses; 2.7.1 Equations of Paraxial Trajectories. Classification of Magnetic Lenses; 2.7.2 Short Magnetic Lenses; 2.7.3 Strong Magnetic Lenses; 2.7.4 Long Magnetic Lenses; 2.8 Aberrations of Axially Symmetric Lenses
2.8.1 Geometric Aberrations

Sommario/riassunto

This book focuses on a fundamental feature of vacuum electronics: the strong interaction of the physics of electron beams and vacuum microwave electronics, including millimeter-wave electronics. The author guides readers from the roots of classical vacuum electronics to the most recent achievements in the field. Special attention is devoted to the physics and theory of relativistic beams and microwave devices, as well as the theory and applications of specific devices.