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| Autore                  | Murayama Y (Yoshimasa)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
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| Nota di contenuto       | Mesoscopic Systems Fundamentals and Applications; Contents; 1 Introduction; 1.1 Mesoscopic Systems; 1.2 Nanoscale Structures; 1.3 Electronics; References; 2 Quantum versus Classical Physics; 2.1 Quantum Effects; 2.2 Quantum Fluctuation; 2.3 Particle-Wave Duality; 2.4 Measurement of an Ensemble of Particles; 2.5 Coherence; 2.6 Visibility; 2.7 Coherence versus Incoherence; References; 3 Quantization; 3.1 Schrodinger Equation and Discrete Energies; 3.2 Bloch Theorem; 3.3 Effective Mass; References; 4 Dimensionality; 4.1 DOS; 4.2 Dimensionality of a Landau Electron; References; 5 Junctions 5.1 Metal-Metal Junction5.2 Homogeneous Semiconductor Junction; 5.3 Heterogeneous Semiconductor Junction; 5.4 Schottky Junction; 5.5 Metal-Oxide-Semiconductor (MOS); References; 6 3D Quantum Systems; References; 7 2D Quantum Systems; 7.1 Single Quantum Well; 7.2 Multiple Quantum Wells; 7.3 Superlattice; 7.4 DOS; 7.5 Landau Electrons; 7.6 Hydrogenic State of Impurity; 7.7 Surfaces; References; 8 1D Quantum Systems; References; 9 0D Quantum Systems; References; 10 Transport Properties; 10.1 Transport Perpendicular to QW; 10.2 |

Transport Parallel to QW; 10.3 Magnetic Response  
10.4 Concepts of Electric Conductivity 10.5 Universal Conductance Fluctuation; 10.6 Quantized Conductance; 10.7 Integral Quantized Hall Effect (IQHE); 10.8 Fractional Quantized Hall Effect (FQHE); 10.9 Ballistic Transport; 10.10 Coulomb Blockade; 10.11 Atomic Wires; References; 11 Optical Properties; 11.1 Single/Multiple Quantum Wells; 11.2 Exciton Absorption in Various Dimensional Geometries; References; 12 Magnetic Properties; 12.1 Fine Particles; 12.2 Magnetic Thin Films; References; 13 Properties of Macroscopic Quantum States; 13.1 Kosterlitz-Thouless Mode in High-Tc SC  
13.2 Superconducting Thin Wires 13.3 Superconducting Tunnel Junction; 13.4 Transport Properties of High-Tc, Cuprates; 13.5 Proximity Effect; 13.6 Andreev Reflection; References; 14 Future Prospects; Appendix A FDM Solution of Schrodinger Equations; Appendix B Effective-Mass Approximated Equation; Appendix C Boundary Conditions for an Interface; Appendix D Hydrogenic Envelope Function in 3D and 2D; Appendix E Transition Probability of Optical Processes; Appendix F Eigenvalue Problem for a Linear Electric Potential; Appendix G Calculation of Conductivity Based on the Kubo Formula  
Appendix H Calculation of Conductivity Tensor in a Magnetic Field Appendix I Landau State in z-Representation; Appendix J Micromagnetism of Stripe Domain; Appendix K Physics Underlying Josephson Junctions; Index; Author Index

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## Sommario/riassunto

Future high-tech applications such as nanotechnology require a deep understanding of the physics of mesoscopic systems. These systems form a bridge between macroscopic systems governed by classical physics and microscopic systems governed by quantum physics. This introduction discusses a variety of typical surface, optical, transport, and magnetic properties of mesoscopic systems with reference to many experimental observations. It is written for physicists, materials scientists and engineers who want to stay abreast of current research or high-tech development.

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