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Nota di contenuto	Title Page ; Copyright; Contents; Preface; Chapter 1 Quantum mechanics ; 1.1 Introduction to quantum mechanics; 1.1.1 The double slit experiment; 1.1.2 Basic concepts of quantum mechanics; 1.1.3 Schrodingers equation; 1.2 Basic quantum physics problems; 1.2.1 Free particle; 1.2.2 Particle in a one-dimensional box; Reference; Chapter 2 Basics of tunnelling ; 2.1 Understanding tunnelling; 2.1.1 Qualitative description; 2.1.2 Rectangular barrier; 2.2 WKB approximation; 2.3 Landauers tunnelling formula; 2.4 Advanced tunnelling models; 2.4.1 Non-local tunnelling models 2.4.2 Local tunnelling modelsReferences; Chapter 3 The tunnel FET ; 3.1 Device structure; 3.1.1 The need for tunnel FETs; 3.1.2 Basic TFET structure; 3.2 Qualitative behaviour; 3.2.1 Band diagram; 3.2.2 Device characteristics; 3.2.3 Performance dependence on device parameters; 3.3 Types of TFETs; 3.3.1 Planar TFETs; 3.3.2 Three-dimensional TFETs; 3.3.3 Carbon nanotube and graphene TFETs; 3.3.4 Point versus line tunnelling in TFETs; 3.4 Other steep subthreshold transistors; References; Chapter 4 Drain current modelling of tunnel FET: the task and its challenges ; 4.1 Introduction

4.2 TFET modelling approach  
4.2.1 Finding the value of  $C$ ; 4.2.2 Modelling the surface potential in the source-channel junction; 4.2.3 Finding the tunnelling current; 4.3 MOSFET modelling approach; References; Chapter 5 Modelling the surface potential in TFETs ; 5.1 The pseudo-2D method; 5.1.1 Parabolic approximation of potential distribution; 5.1.2 Solving the 2D Poisson equation using parabolic approximation; 5.1.3 Solution for the surface potential; 5.2 The variational approach; 5.2.1 The variational form of Poisson's equation 5.2.2 Solution of the variational form of Poisson's equation in a TFET 5.3 The infinite series solution; 5.3.1 Solving the 2D Poisson equation using separation of variables; 5.3.2 Solution of the homogeneous boundary value problem; 5.3.3 The solution to the 2D Poisson equation in a TFET; 5.3.4 The infinite series solution to Poisson's equation in a TFET; 5.4 Extension of surface potential models to different TFET structures; 5.4.1 DG TFET; 5.4.2 GAA TFET; 5.4.3 Dual material gate TFET; 5.5 The effect of localised charges on the surface potential; 5.6 Surface potential in the depletion regions 5.7 Use of smoothing functions in the surface potential models References; Chapter 6 Modelling the drain current ; 6.1 Non-local methods; 6.1.1 Landauer's tunnelling formula in TFETs; 6.1.2 WKB approximation in TFETs; 6.1.3 Obtaining the drain current; 6.2 Local methods; 6.2.1 Numerical integration; 6.2.2 Shortest tunnelling length; 6.2.3 Constant polynomial term assumption; 6.2.4 Tangent line approximation; 6.3 Threshold voltage models; 6.3.1 Constant current method; 6.3.2 Constant tunnelling length; 6.3.3 Transconductance change (TC) method; References  
Chapter 7 Device simulation using ATLAS

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## Sommario/riassunto

"This one-stop study aid to TFETs is aimed at those who are beginning their study on TFETs and also as a guide for those who wish to design circuits using TFETs. The book covers the physics behind the functioning of the TFETs and their modelling for the purpose of circuit design and circuit simulation. It begins with a brief discussion on the basic principles of quantum mechanics and then builds up to the physics behind the quantum mechanical phenomena of band-to-band tunnelling. This is followed by studying the basic functioning of the TFETs and their different structural configurations. After explaining the functioning of the TFETs, the book describes different approaches used by researchers for developing the drain current models for TFETs. Finally, to help the new researchers in the area of TFETs, the book describes the process of carrying out numerical simulations of TFETs using TCAD. Numerical simulations are helpful tools for studying the behaviour of any semiconductor device without getting into the complex process of fabrication and characterization"--

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