Carroll

Rate Equations in Semiconductor Electronics

This book presents a novel approach to the teaching of dynamic aspects of the operation of semiconductor and opto-electronic devices. Such dynamic aspects often determine the steady state conditions. Also, the dynamical operation of such devices is of increasing importance as modern methods of communicating data and information require electronic devices that switch electrical or optical signals at ever faster rates. The author discusses the rates at which electrons and holes can reach equilibrium, the rates at which transistors and diodes can switch, and the rates at which electrons and holes can interact with photons, and with protons. He also applies the rate equations in a unified way to models of light-emitting diodes, injection lasers and photodiodes. Finally, the author discusses more-advanced topics on the photon statistics of injection lasers, mode-locking and the application of rate equations and Maxwell's equations to opto-electronic devices.

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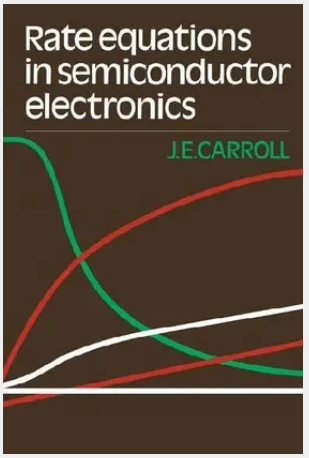

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