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标题: Terahertz Frequency Response of Electrons in a Single-walled Zigzag Carbon Nanotube
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摘要: We theoretically study the frequency-dependent characteristic of the electron dynamic mobility in a semiconducting, single-walled, zigzag carbon nanotube (CNT). The dynamic mobility is obtained by solving the balance equations and taking into account the relaxation processes within a nonparabolic band picture. The electron mobility is shown to exhibit a large and fast response to an external ac electric field. For fields above the threshold electric field corresponding to the peak drift velocity, the calculation predicts a cutoff frequency in the range of terahertz frequency, above which the negative differential mobility disappears. The numerical results indicate that the semiconducting CNT can be exploited for generation and amplification of terahertz signals.
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