# Simulasi kurva karakteristik arus-tegangan pada divais single electron transistor terhadap empat parameter yang divariasikan satu per satu = The simulation of current-voltage characteristic curve of single electron transistor devices towards four parameters being varried one by one

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Abstrak

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Penelitian dalam bidang nanoteknologi telah berkembang pesat dalam dekade terakhir ini, salah satunya adalah Single-Electron Devices. Dalam skripsi ini, kurva karakteristik arus-tegangan dari divais single-electron transistor (SET) disimulasikan dalam kasus empat parameter kerjanya divariasikan secara satu per satu. Keempat parameter itu adalah kapasitansi, resistansi, temperatur, dan impuritas. Struktur divais SET yang disimulasikan terbagi menjadi dua, satu yang menggunakan dua kapasitor dan lainnya yang menggunakan tiga kapasitor. Ketika simulasi dimulai, hanya satu parameter yang nilainya divariasikan sementara ketiga parameter lainnya tetap dijaga pada nilai awal yang telah ditentukan sebelum simulasi berjalan. Simulasi dijalankan dengan menggunakan Matlab 2008. Metode persamaan diturunkan berdasarkan master equation. Salah satu hasil yang didapat dari riset ini adalah resistansi sebagai parameter yang memberikan pengaruh paling signifikan pada rentang arus yang diukur, yaitu 10-11 A hingga 10-10 A pada struktur dua kapasitor dan 10-9 A hingga 10-8 A pada struktur tiga kapasitor. Adapun beberapa efek yang terjadi pada kurva karakteristik arus-tegangan adalah perubahan kualitas grafik, melemah/menguatnya karakteristik eksponensial dan/atau ideal, dan perubahan nilai step-width dan/atau step-height.
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ABSTRACT<br>
The research in the field of nanotechnology has advanced rapidly within the last decade, one of them being Single-Electron Devices. In this script, the current-voltage characteristic curve of single-electron transistor (SET) device are simulated in the case of the four working parameters were varied one by one. Those four parameters were capacitances, resistances, temperature, and impurity. The device?s structure of SET being simulated was divided into two, one which was using two capacitors and the other which was using three capacitors. When the simulation was run, there is only one parameter which value was varied while the other three parameters were kept at starting value which had been decided before the simulation was run. The simulation was run by using Matlab 2008. The equation method was derived from master equation. One of the results gained from this research is resistance as the parameter which has the most significant influence over the range of the current being measured, which is 10-11 A to 10-10 A in two capasitors structure and 10-9 A to 10-8 A in three capasitors structure. Some of the effects that happened to the current-voltage characteristic curve are the change of graphical quality, the exponential and/or ideal characteristic becomes strongger/weaker, and the value change of step-width and/or step-height.