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Quantum transport in carbon nanotube field effect transistors[1]
KALMAN VARGA, S.T. PANTELIDES, Vanderbilt University — We have investigated the transport properties of carbon nanotube field effect transistors using the recently developed source-and-sink method [1]. We report first-principles results on the current-voltage characteristics of semiconducting carbon nanotubes in transverse electric field, highlighting differences with Si-based devices, e.g., band mixing caused by the gate electric field. We also find that the source-drain current exhibits an intrinsic saturation as function of the gate voltage. The calculated results are in good overall agreement with pertinent experiments.

[1] K. Varga and S. T. Pantelides, Phys. Rev. Lett. submitted for publication.

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