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Probing of wavefunctions in 2D-electronic waveguides: an exact approach[1] ARKADY SATANIN, RONALD COSBY, YONG JOE, Ball State University, Muncie, IN — Scanning probe experiments give very important information about coherent electron current flow in 2D nanostructure electronic waveguides (M.A.Topinka et al.). Recently an approach based on the recursive Green's function method has been effectively used to simulate electronic patterns. We present here analytical calculations of conductance variations in 2D-waveguides, modeling the probe experiments with a short range potential. It was shown that the wavefunction variation in a waveguide may be expressed exactly through the Green's function of an unperturbed system if the characteristic size of the probing potential is less than the Fermi wavelength. The variation of the conductance of different geometrically shaped perfect waveguides and waveguides with quantum dots (QD's) has been investigated. We have found that in general the variation of the conductance depends on the phase interference of different waveguide modes. We have investigated the changes on the plateau's threshold when the probe is placed in a perfect waveguide. In the waveguide with an attractive QD we have found that near a resonance in conductance variation, the dominant terms are proportional to a resonant wavefunction. In addition, we have studied the effects of wave interference and the probing of the wavefunction when there is a Fano resonance in the conductance.

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