Bloch Oscillations of a Two-Dimensional Electron Gas in a Lateral Superlattice[1] S.K. LYO, W. PAN, J.L. RENO, J.A. SIMMONS, Sandia National Laboratories, D. LI, S.R.J. BRUECK, University of New Mexico — We present theoretical result and experimental data for the DC current of a quasi-two-dimensional electron gas in a high electric field. The theoretical model considers inelastic scattering in a relaxation-time approximation and two-dimensional elastic scattering microscopically including inter-Bloch-band scattering in the degenerate and nondegenerate regime. The results show standard negative differential conductance. Inclusion of the effect of the electric field for the inelastic relaxation rate tends to flatten (i.e., saturate) the current after the peak current as a function of the field, yielding improved agreement between the theory and the observed data from modulated $GaAs/Al_xGa_{1-x}As$ quantum wells.

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