

## Current Oscillation and dc-Voltage-Controlled Chaotic Dynamics in Semiconductor Superlattices

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**Abstract:** We report a detailed theoretical study of current oscillation and dc-voltage-controlled chaotic dynamics in doped GaAs/AlAs resonant tunneling superlattices under crossed electric and magnetic fields. When the superlattice is biased at the negative differential velocity region, current self-oscillation is observed with proper doping concentration. The current oscillation mode and oscillation frequency can be affected by the dc voltage bias, doping density, and magnetic field. When an ac electric field with fixed amplitude and frequency is also applied to the system, different nonlinear properties show up in the external circuit with the change of dc voltage bias. We carefully study these nonlinear properties with different chaos-detecting methods.

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Key words: semiconductor superlattices, current oscillation, chaotic dynamics

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