

A Possible Minimum Toy Model with Negative Differential Capacitance for Self-sustained Current Oscillation

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Abstract: We generalize a simple model for superlattices to include the effect of differential capacitance. It is shown that the model always has a stable steady-state solution (SSS) if all differential capacitances are positive. On the other hand, when negative differential capacitance is included, the model can have no stable SSS and be in a self-sustained current oscillation behavior. Therefore, we find a possible minimum toy model with both negative differential resistance and negative differential capacitance which can include the phenomena of both self-sustained current oscillation and I-V oscillation of stable SSSs.

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Key words: self-sustained current oscillation, negative differential capacitance

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