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Finite size effects in the decay of metastable states in one-dimensional resonant tunneling structures[1] OLEG TRETIAKOV, Johns Hopkins University, KONSTANTIN MATVEEV, Argonne National Lab — We study the current switching in a double-barrier resonant tunneling structure in the regime where the current-voltage characteristic exhibits intrinsic bistability, so that in a certain range of bias two different steady states of current are possible. Near the upper boundary V_{th} of the bistable region the upper current state is metastable, and because of the shot noise it eventually decays to the stable lower current state. We find the time of this switching process in strip-shaped devices, with the width small compared to the length. The mean switching time τ increases exponentially as the bias V is tuned inside the bistable region from its boundary value V_{th}. The one-dimensional geometry of the problem enables us to obtain analytically exact expressions for the exponential factor and to calculate the prefactor of τ for an arbitrary length of the strip. Furthermore, we evaluate the mean time of switching in ring-shaped devices, with the widths small compared to their diameters.

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