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Title:	Realization of reliable and flexible logic gates using noisy nonlinear circuits
Authors:	Sinha, Sudeshna (/jspui/browse?type=author&value=Sinha%2C+Sudeshna)
Keywords:	Bistable dynamics Circuit implementation Circuit noise Controlled symmetry Linear resistors
Issue Date:	2009
Publisher:	American Institute of Physics.
Citation:	Applied Physics Letters, 95 (19), art. no. 194102,
Abstract:	It was shown recently [Murali, Phys. Rev. Lett. 102, 104101 (2009)] that when one presents two square waves as input to a two-state system, the response of the system can produce a logical output (NOR/OR) with a probability controlled by the interplay between the system noise and the nonlinearity (that characterizes the bistable dynamics). One can switch or "morph" the output into another logic operation (NAND/AND) whose probability displays analogous behavior; the switching is accomplished via a controlled symmetry-breaking dc input. Thus, the interplay of nonlinearity and noise yields flexible and reliable logic behavior, and the natural outcome is, effectively, a logic gate. This "logical stochastic resonance" is demonstrated here via a circuit implementation using a linear resistor, a linear capacitor and four CMOS-transistors with a battery to produce a cubiclike nonlinearity. This circuit is simple, robust, and capable of operating in very high frequency regimes; further, its ease of implementation with integrated circuits and nanoelectronic devices should prove very useful in the context of reliable logic gate implementation in the presence of circuit noise.
Description:	Only IISERM authors are available in the record.
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