一种基于忆阻器的可重构逻辑电路

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摘　要：为解决现有忆阻器电路逻辑功能单一与结构简单之间的矛盾，论文设计了一种具有可重构功能的忆阻器逻辑电路.该电路利用忆阻器具有记忆电阻的特性，通过预置和逻辑运算两个操作步骤，可以实现大多数的逻辑操作.为了使该电路具备逻辑功能的完备性，其他未实现的逻辑操作可以采用基于实质蕴涵和非逻辑的逻辑迭代运算来实现；并通过设计异步时序结构克服电路逻辑的误操作，增强电路稳定性.与其他已提出的基于忆阻器逻辑电路相比，此电路用较少的忆阻器与操作步骤去实现更多的逻辑功能.通过使用 P-spice 仿真，验证了逻辑电路的可行性.

关键词：忆阻器； 可重构；实质蕴涵; 逻辑运算

A reconfigurable logical circuit based on memristor

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Abstract：To solve the contradiction between simple logical functions and simple circuit structure, a kind of reconfigurable logical circuit based on memristor was designed in this paper. By using the characteristics of memory and two operation steps of initialization and logical operation, most of logic functions can be implemented. The other logic functions can be realized by the iterated operation based on IMP and FALSE. To overcome the logic misoperation and enhance the stability of the circuit, an asynchronous sequential circuit structure was employed. Compared to other logical circuit based on memristor, less memristors and logical steps are used to implement more logical functions. The Pspice simulation results verified the feasible of the circuit.

Key words：Memristor； Reconfigurable；Asynchronous Sequential；Imply；Initialization；Logic operation

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