A Study of Threshold Voltage Extraction in MOSFET Devices

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ABSTRACT

We clearly know that the accuracy of a device model in predictingdevice characteristics is dependent on the correct parameters of themodel. In the thesis, we completely investigate how to determine thethreshold voltage of MOSFET devices. In order to succeed in getting threshold voltage, we present a new physically based method for measuringthe threshold voltage of MOSFET devices. This novel method, called the bulk charge varying (BCV) method, is based on the drain current to include the bulk charge variation from the source end to the drain end. The BCV method will be a new accurately technique for experimentallyextracting the threshold voltage of MOSFET devices. Actually, the threshold voltage is functions of channel width and channel length. Based upon the BCV method, we will develope a new model,called the BCVW model, for the MOSFET threshold voltage profiling behaviorstrongly depends on the channel width of the devices. Meanwhile, the BCVWmodel is not sensitive to the measurement noise and error which is due toby using a nonlinear optimization method (L-M method). Nevertheless, an anomalous reverse short-channel effect has been detected in the DDD n-MOSFET devices. In order to solve the complex reverse short-channelproblem, the fuzzy theory and neural network techniques will be used in thefuture directed guide.

Keywords : BCVW模型 ; threshold voltage ; BCV method ; BCVW model ; Fuzzy and neural

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