A Study of Modeling Development for High Voltage DMOS Transistors by Using Fuzzy Theory and Neural Network

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ABSTRACT

In recent years, a semiconductor device dimension in ultra large-scale integrated circuits (ULSI ’ s) have been kept shrinking in order to achieve higher device/circuit density and to reduce the product costs. But it has brings more nonlinearity effects. These effects resulting in the performance of actual device have some difference as compare with the ideal device. Therefore, the modeling development of the semiconductor device has become more and more important. In this thesis, a new methodology is proposed to modeling the highly voltage DMOS by using Adaptive Neuro Fuzzy Inference System (ANFIS), which combines fuzzy theory and adaptive neural network, and predicting device behaviors in the power DMOS with different channel length and channel width under different bias situations. At first, two groups of power DMOS devices with different channel length and channel width were fabricated separately. In the following, the drain current of all devices under different bias conditions were measured. And then input the measurement data treat as the training data. The experimental results have proven that the power of ANFIS used as a realization of I-V characterizations. The prediction results are also compared with experimental data of the actual devices, eventually, which can be obtained a good agreement.

Keywords : fuzzy theory ; neural network

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