

CMOS Circuit for MOS Transistor Threshold Adjustment:  
A Means for Neural Network Weight Adjustment

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SUMMARY

In this paper we describe a new CMOS circuit that is developed to behave like an MOS transistor with a threshold voltage that is easily adjusted by external control.

The circuit is shown in Fig. 1 and is designed to be used in neural-type circuit applications, where threshold voltage adjustments can act to fix the connection weights which determine the amount of transmission from one neuron's output to another neuron's input [1]. The circuit was developed by observing the models used for floating gate transistor devices [2] which are popular in semiconductor memory. The idea led to a technique for construction of threshold controlled CMOS devices which could be easily fabricated in conventional CMOS process technology. The circuit developed introduces a capacitive coupling between the input gate of the MOS transistor and a controlling input voltage through a differential amplifier tube circuit. In some cases the capacitive coupling need only involve parasitic capacitors so that no extra capacitor needs to be inserted. The PSPICE [3] simulation program was used to simulate the circuit giving the V-I characteristics of the device for different controlling voltages shown in Fig. 2. In the talk the principle of operation and layout of the circuit will be discussed and applications to neural type circuits will be illustrated.

REFERENCES

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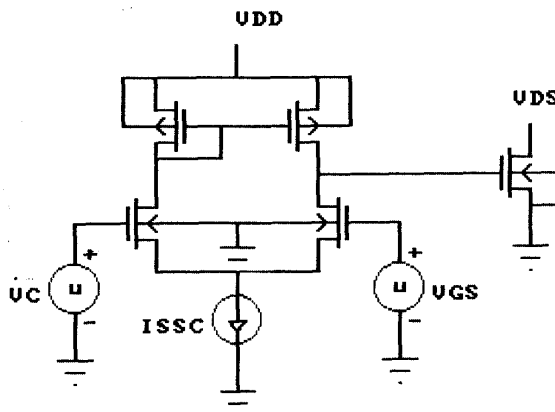
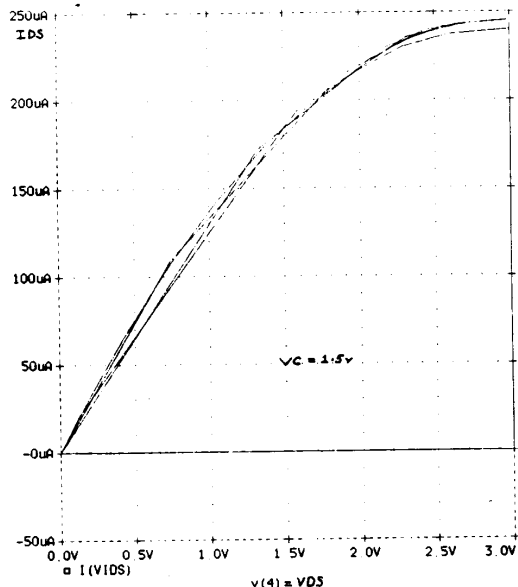


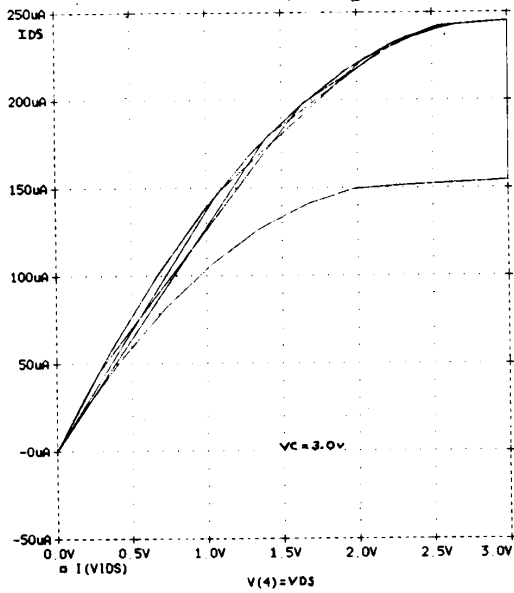
FIGURE 1  
THRESHOLD ADJUST CIRCUIT

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a)



b)

FIGURE 2