INVESTIGATION OF SUBMICRON MOSFET'S BEHAVIOUR

BY

IDREES S. AL-KOFAHI

This dissertation is submitted as part of the requirements for the degree of Master of Science in Microelectronics and Information Engineering by the Council for the National Academic Awards.

School of Electrical and Electronic Engineering

LIVERPOOL JOHN MOORES UNIVERSITY

OCTOBER 1993
Abstract

This project is mainly concerned with the simulation of submicron MOSFETs. The simulation package is MINIMOS.

An overview of the package, including the basic equations and the numerical method used is given. The capability and the shortcomings of the package are presented. The simulation is compared with experiments and the agreement is satisfactory. The effects of operation and processing parameters on MOSFET's behaviour are studied. Drain engineering is carried out to suppress the hot-carrier effects. The Lightly Doped Drain (LDD) and Profiled Lightly Doped Drain (PLDD) structures are optimised.

The device degradation due to the interface and oxide charge generation is simulated. The parameters investigated include the generated charge density and the width of degradation region. The results are used to validate the previously proposed degradation models.