M I N I M O S

A PROGRAM PACKAGE TO FACILITATE MOS DEVICE DESIGN AND ANALYSIS

S.Selberherr, W.Fichtner and H.W.Pötzl

Institut für Physikalische Elektronik der Technischen Universität
Wien, Gusshausstrasse 27 - 29, A-1040 Vienna, Austria

Abstract

We describe a program package for the twodimensional numerical
exact simulation of planar MOS structures. The model is based
upon the fundamental semiconductor equations (Poisson's equation,
Continuity equations and current relations for electrons and holes).
To ensure maximum flexibility and low computing costs sophisticated
programming methods have been used.Dynamic memory management feasi-
bility has been included to adjust automatically the memory require.
ments to the number of grid points. Large parts of the solution rou-
tines are assembly coded and allow a very fast execution. The input
processor syntax is easy to read and is shown to be fully compatible
with a recently published proposal for a unified input syntax for
CAD programs.

For one operating point typical execution times have been found to
be between 15 and 60 seconds on a CDC Cyber 74 depending on bias
values. The calculation of the current-voltage characteristics of a
planar MOS transistor (10 operating points)in the subthreshold region
can be performed in about 120 seconds CPU time.

The program has been successfully tested for widely varying
devices, geometries and bias conditions. Reasonable agreement
between theory and experiment has been obtained in almost all
cases.