

ADVANCES IN MULTI-DIMENSIONAL TCAD

W. Fichtner

Integrated Systems Laboratory, Swiss and Federal Institute of Technology

and

ISE integrated Systems Engineering AG

Gloriastrasse 35

CH-8092 Zürich

Switzerland

Over the past few years, numerical process and device simulation have become increasingly popular in academic and industrial environments. Analogous to other fields such as biochemistry, petroleum and aerospace engineering, and weather forecasting, the use of software tools offers many advantages over the classical experimental approach.

Modern computing environments such as the latest generation of workstations permit simulations that were thought to be impossible before. Based on these impressive advances in computer hardware, TCAD (Technology Computer Aided Design) is one of the premier candidates for a virtual reality approach towards understanding, optimizing and predicting new process technologies, devices and circuits.

The push towards higher device density, smaller active feature sizes and more advanced fabrication steps puts stringent requirements on the quality, robustness and accuracy of TCAD software tools. The enormous complexity of today's micro- and opto-electronic devices has generated a strong need for better modeling support, especially in two and three dimensions.

In this presentation, a survey of the present multi-dimensional process and device simulation tools will be given. Particular emphasis will be laid upon structure and grid generation, the impact of numerical methods and computer architectures, and the need for parallel processing to tackle the problems of tomorrow.