Graphic-Interactive Program-System for Device Simulations

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Introduction

With the progress of the device technology, device structures become more complicated. For the simulation of such a device, an input of the device structure is a time-consuming task for a user. We have developed an efficient graphic-interactive program-system for the input of two-dimensional device structures. The present system can handle the various material data and then can be also applied to optical devices, in addition to electronic devices.

Program-System

In the process of creating the device shape and the other simulation data, it is imperative that the interactive input and/or modification can be easily and also frequently done by users. To facilitate a user-friendly construction, the present program-system composes several modules as shown in Fig.1 on an engineering workstation; device shape input module, physical model and bias sequence input module, grid generation module and graphic output module. In the parameter input process at each module, an interactive mouse operation which can replace any keyword or value is implemented in a multi-window environment. The supervisor program serves as a common shell for the automatic file management between modules. Thus, these features relive the user of monotonous tasks. Furthermore, to reuse device shape data effectively, data structure for device shape is a key factor.

Data Structure

For an efficient construction of the device shape and material data, the device data are composed of two components such as the topological data and the coordinate data as shown in Fig.2. The topological data represent only the connection information between the vertices in a device and not directly the coordinates information. Therefore, in the case when the channel length is modified in a simulation device, only coordinate data are changed with the common topological data according to the sequence as shown in Fig.2. The use of such hierarchical data structure results in the improvement of the data handling and then allows device data to be reused easily with the other data such as the material and boundary data unchanged.

Application

Typical modules of the present program-system are shown in Fig.3. This system serves as a user-friendly graphic interface for a device simulation and reduces the turn around time for a device parameter change by about one order.
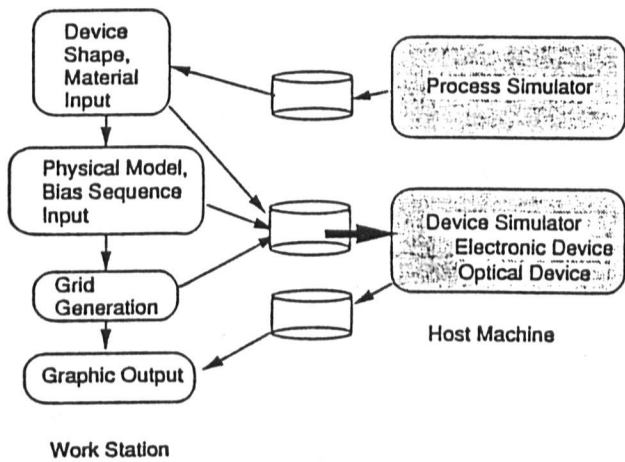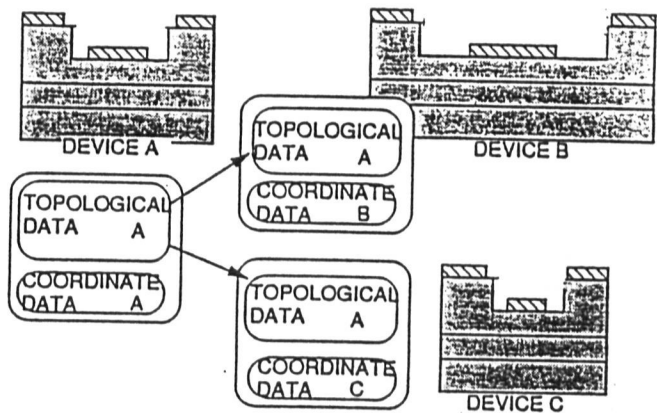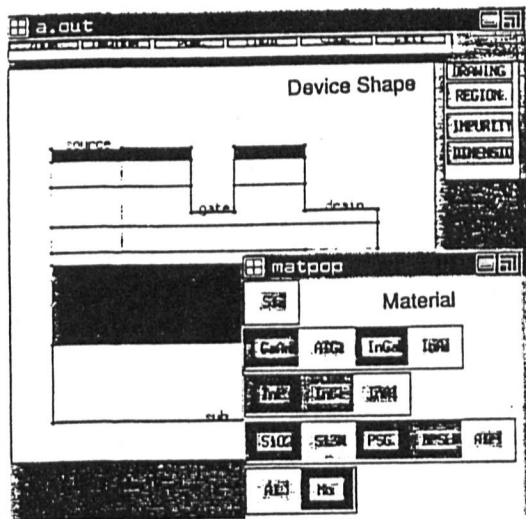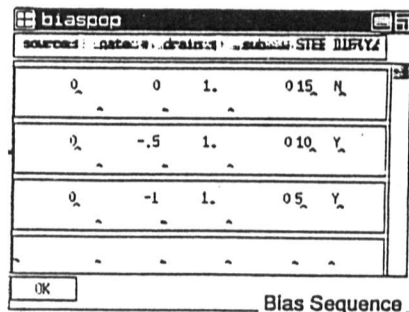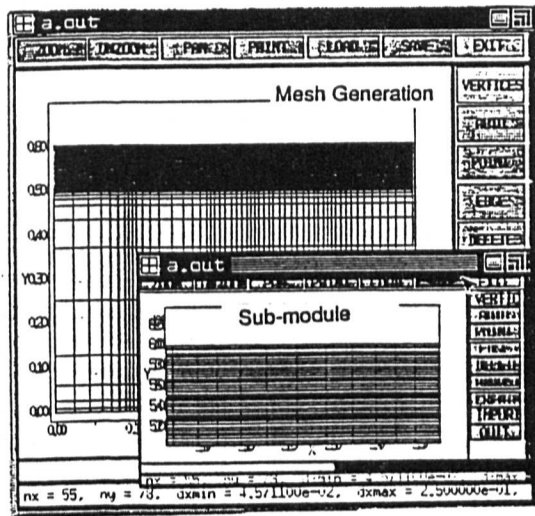
Fig.1 Program-System
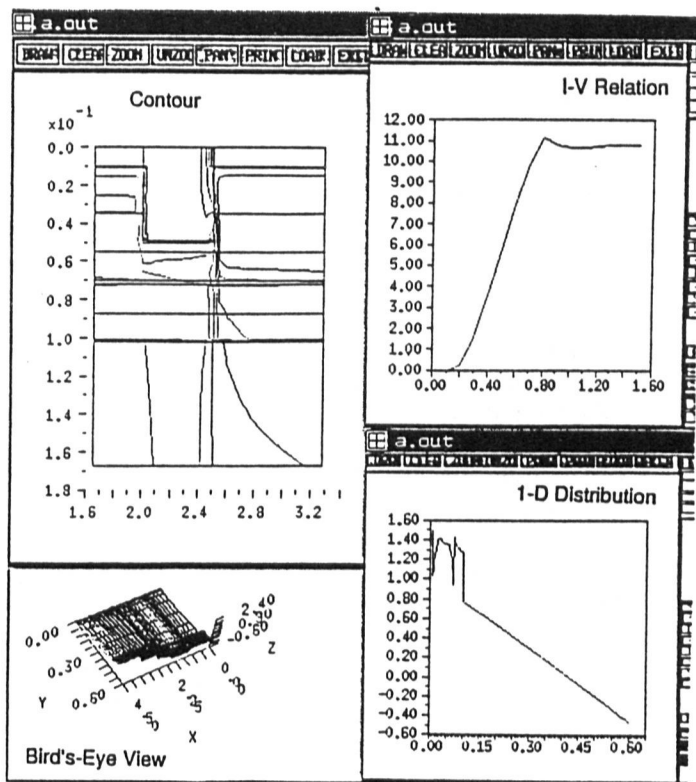

Fig.2 Data Structure

(a) Device Shape Input

(b) Bias Sequence Input

(c) Mesh Generation

(d) Graphic Output

Fig.3 Typical Modules