BAMBI - THE DESIRE FOR THE IMPOSSIBLE?

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The effort for the development of the two-dimensional transient device simulation program BAMBI sums up to 7 men-years over a period of 4 years. There have been spent about 90 CPU-days on a CDC Cyber 170/720 up to now in order to complete and test the code. The CDC Cyber 170/720 offers roughly 1.3 times the performance over a VAX 11/780, however, the operating system NOS of CDC does not include virtual memory. The maximum memory available on the CDC Cyber is 880 Kilo-Bytes. The CDC Cyber has to be shared with all departments of the Technical University in Vienna. In view of these facts one probably can understand the title of the talk.

There is actually one dominant reason why the new discretisation scheme "Finite Boxes" has been developed. To explain this reason one first should recall the demands for discretisation with a universal simulation program: a) Device domains must not be restricted to rectangular domains. b) Local mesh refinement has to be possible without leading to an explosion of the number of mesh points. These demands would lead to the conclusion that a "Finite Element" approach should be optimally suited for discretisation. However, the continuity equations can exhibit a hyperbolic character for certain device operating conditions, so that a wind-ward discretisation dependent on the local electric field has proven over the years to be a mandatory prerequisite to obtain sufficiently accurate simulations. Wind-ward discretisation in the context of semiconductor simulation has now been successfully under investigation for "Finite Differences" and almost no results are available for "Finite Elements". Therefore the classical "Finite Difference" method has been generalized to "Finite Boxes" by keeping the local orthogonality of mesh edges and introducing the local refinement capabilities of "Finite Elements" and, last but not least, eliminating the intrinsic overhead costs of a classical "Finite Element" approach.