

REPORT

REPORT OF THE NASECODE III CONFERENCE

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The third international conference on the Numerical Analysis of Semiconductor Devices and Integrated Circuits, NASECODE III, was held in Galway, Ireland from 15–17 June 1983, under the auspices of the Numerical Analysis Group. It was attended by over 120 delegates from 18 countries. The aim of this series of conferences is the fostering of a fruitful exchange of ideas between electronic engineers and numerical analysts, who are using existing and developing new computer codes for semiconductor process, device and integrated circuit modelling.

As on previous occasions the industrial sector was strongly represented and it is our policy to ensure that the topics discussed at these conferences are relevant to the needs of industry. This ensures that the scientific and technical material presented at the conference is not only intellectually challenging, but also of great practical importance.

The application of numerical methods to semiconductor device modelling began about 17 years ago, and since then it has developed and broadened in scope very rapidly. To date, relatively few professional numerical analysts have worked in this area, and consequently it is still a fertile source of stimulating unsolved problems of widely varying degrees of difficulty.

The models of technological importance are mainly in two space dimensions and they may also be time dependent. Typically, two or three nonlinear differential equations have to be solved on complicated domains with a variety of boundary conditions. Computational experience indicates that the systems are often very stiff.

For the numerical analyst there is a wealth of problems. Frequently, underflow and overflow occur and special tricks have to be used to allow the computation to proceed. Convergence of the iterative method for solving the discrete nonlinear system is usually a problem. The very fine meshes generally used in certain parts of the domain give rise to large discrete systems, and consequently the systems to be solved after linearisation are large. Many standard linear equation solvers, both direct and iterative, are impractical or simply fail for these problems. The development of practical and efficient

techniques for solving extensions of these problems to three space dimensions and to the non-stationary cases are also needed.

For a representative collection of papers on the subject the reader may consult the five publications (1), (2), (4), (9) and (10) associated with the NASECODE conferences. The first two monographs on the subject are Kurata (3) and Mock (5). The main journals covering engineering aspects are (6) and (7), while the more computational and mathematical aspects are discussed in journal (8). The fourth conference in the series NASECODE IV, will be held in Dublin, Ireland from 19–21 June 1985.

BIBLIOGRAPHY

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- (3) M. Kurata. *Numerical Analysis for Semiconductor Devices*. Lexington Books, Massachusetts (1981).
- (4) J. J. H. Miller (ed). *An Introduction to the Numerical Analysis of Semiconductor Devices and Integrated Circuits*, Lecture Notes of a Short Course held in association with the NASECODE II Conference. Boole Press, Dublin (1981).
- (5) M. S. Mock. *Mathematical Analysis of Semiconductor Devices*. Boole Press, Dublin (1983).
- (6) *I.E.E.E. Transactions on Electron Devices*. The Institute of Electrical and Electronics Engineers, New York.
- (7) *Solid-State Electronics—An International Journal*. Pergamon Press, Oxford.
- (8) *COMPEL—The International Journal for Computation and Mathematics in Electrical and Electronic Engineering*. Boole Press, Dublin.
- (9) J. J. H. Miller (ed). *NASECODE III, Proceedings of the Third International Conference on the Numerical Analysis of Semiconductor Devices and Integrated Circuits*. Boole Press, Dublin (1983).
- (10) J. J. H. Miller (ed). *Finite Element Programming with Special Emphasis on Semiconductor Device and Process Modelling*, Lecture Notes of a Short Course held in association with the NASECODE III Conference. Boole Press, Dublin (1983).