Editorial

BEING somewhat at a focal point of computer-oriented microwave practices in the capacity of Associate Editor (Computer Program Descriptions) of this TRANSACTIONS, as well as Guest Editor of this Special Issue, I am exposed to a wide range of opinions held by contributors to the field as well as by users. A representative sample of these opinions is in evidence in the Panel Discussion that follows this Editorial.

On the one hand, there are those who presumably feel that available computational techniques are already adequate enough and more effort should be devoted to solving *real* engineering design problems (by others). On the other hand, there are those who feel that most techniques are not yet sufficiently reliable or efficient to effectively tackle these real problems. Interestingly enough, many of the subscribers to the latter view are *users* or potential users of numerical techniques and many of the subscribers to the former view are *contributors* of numerical techniques. It is this dichotomy that may impede the advance of computer-aided design in its present direction.

The present state of the art, it seems to me, lies somewhere in between. It might be noted, incidentally, that computing costs are real problems also, notwithstanding the significant advances in hardware. At the engineering level, it is still often a difficult and expensive task for a designer wishing to make full use of available programs. As our ambitions increase, this state of affairs is likely to be continually present.

Industry is presumably faced with real problems, among which is the problem of staying in business. To that end they seek to obtain, from their point of view, usable or economic solutions to their design problems. Approaches may have to be adopted with results often only superficially relevant to other problems. Advances, however, will surely take place most often and economically if smaller more manageable artificial problems embodying the essential features of the real problems are used for testing purposes. The *formulation* should be realistic but the *results* should demonstrate, generally at least, very fast convergence to highly accurate rather than realistic solutions. Somehow, confidence in an algorithm's ability to solve real problems efficiently must be gained even before these real problems are attempted.

I feel that what will distinguish the present decade from the previous one is the increasing use of rigorously derived methods for design rather than only for analysis. The proliferation of ad hoc algorithms, which in my view mark the previous decade and whose value in relation to existing algorithms (even on the simplest problems) were often inadequately tested, will, I am sure, give way to more soundly based approaches.

I believe that the turning point was already reached at some fuzzy stage between the appearance of the 1969 Special Issue on Computer-Oriented Microwave Practices of the IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES and the 1971 Special Issue on Computer-Aided Circuit Design of the IEEE TRANSACTIONS ON CIRCUIT THEORY. If the previous decade was one of optimism and experimentation, then the present one will be marked by consolidation and generalization. Perhaps, towards the end of the decade we might even see some *significant* attempt at automated design applied to a real design problem!

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My thanks go to the authors of the invited and contributed papers as well as the numerous reviewers for their excellent work.

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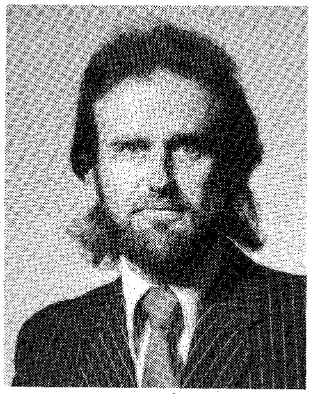

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