If $p = p'$ then $q = p + q'$, that is $q > q'$, therefore $(\mathscr{F}_n)^p \nsubseteq (\mathscr{F}_{n+1})^p$ but $\mathscr{F}. \subseteq \mathscr{F}.$ otherwise $p' < q$ and $(\mathscr{F}_n)^p \nsubseteq (\mathscr{F}_{n+1})^p.$, but $(\mathscr{F}_n)^{p.+p}\mathscr{F} \rightarrow \mathscr{F}.$, as $n \geqslant 2$ and $q' < n(p' - p) + q$.

Concluding remarks

We have investigated two variations on a basic model of m synchronised processors, $m > 0$, which become active and die simultaneously. We have shown that when $\bar{n}$ of the processors are always active, and are allowed to become idle or die independently of each other, that we cannot compute anything that could not be computed with a single processor. In the second variation once a processor becomes active it can either remain active or die, it cannot become idle again. It is also required that the n leftmost live processors that become active die simultaneously. In this case we have shown that we can compute something that cannot be computed by the basic model. Further we have shown that something can be computed by the basic model that cannot be computed by this variation on it and that there are things that can be computed by both of them.

It is possible to look at other variations, for example, variation 1 together with the requirement that the processors must die in some prescribed order, left-to-right, say. Or we can remove the leftmost restriction in variation 2 and replace it by giving some prescribed order for processors to become active and die.

In Wood (1973) the properties of $\mathscr{F}_n$, $n > 0$, are investigated and the relationship of $\mathscr{F}_n$ to the family of n-parallel right linear languages of Rosebrugh and Wood (1975) is shown.

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Book reviews

Finite Orthogonal Series in the Design of Digital Devices, by M. G. Karpovsky, 1976; 251 pages. (*Israel Universities Press: John Wiley*, £17·15)

Very few logic designers are aware of the meaning of the term 'orthogonal series' and, indeed, that they may be applied to logic design.

The concept is simply this. Taking a combinational circuit one can assume that its inputs are scanned in a predefined order by means of some kind of counter. Assigning numerical values to bit patterns at the output, one obtains a series of 2^n numbers in a range of 2^n integers, where n is the number of inputs and k the number of outputs. This time series may be transformed by Fourier or Walsh (or other) means to a spectral form. This is the 'orthogonal' series and uniquely represents the circuit. This book is the first of its kind to contain the complete theory of this concept, and enters both practical and theoretical design areas. Perhaps a little hard going and unconvincing for the practically minded designer, but fascinating for those with inclinations towards mathematical rigour.

I. ALEKSANDER (Uxbridge)

Lecture Notes in Computer Science Vol. 19, edited by G. Goos and J. Hartmanis, 1974; 425 pages. (*Springer Verlag*, $14.30)

This volume of the *Lecture Notes* series contains the Proceedings of the Programming Symposium held in Paris in 1974 under the auspices of the Institut de Programmation de Paris. It consists of a mixed bag of papers on various aspects of programming. Of the papers 22 are in English and 7 are in French. It is not clear what the purpose of the symposium was: the papers are all of a theoretical flavour, but there is no clear theme running through the Proceedings to link them together.

The section headings will give some idea of the flavour of the book—they include Structured Programming, Program Correctness, Proving Properties of Programs, Applications of Programming Languages, Control Structures, Schematology (whatever that may be!) Theory of Programming, Parallel Processing and Formal Semantics. None of the sections contains more than three papers, confirming the view that the organisers of the symposium belong to the pick 'n' mix school—something for everybody, but not much for anybody.

The volume will probably be most referenced by future writers because it contains Zahn's paper 'A control statement for natural top-down structured programming'. In this paper Zahn proposes a remedy for one of the real trouble-spots in structured programming—how to get out of a loop on an abnormal termination.

I enjoyed Zahn's paper, and another one by Lampson, Mitchell and Satterthwaite, 'On the transfer of control between contacts'. And that probably sums up the book—if your work takes you into current research areas in programming and programming languages, you may find one or two papers that interest you. But that is all.

D. W. BARRON (Southampton)

Optimization and Operational Research, Proceedings of a Conference held at Oberwolfach in 1975, 1976; 316 pages. (*Springer-Verlag*, Lecture Notes in Economics and Mathematical Systems, Vol. 117, US $11.50)

The short conferences on mathematical topics that take place at Oberwolfach year round are an important part of the international mathematical scene. The proceedings are distinguished by their high mathematical quality. Participants attend by invitation of the organisers. The bias of papers is usually theoretical whether or not the subject is an 'applied' one. The proceedings now under review have appeared rapidly, as is consistent with the publisher's policy for its Lecture Note series. An unavoidable consequence is that papers lack careful editorial screening, but this is not a grave fault and it hardly obscures the content.

Twenty-seven papers are included in this issue, the authors being principally from German institutions. The major theme is so-called mathematical programming in one or other of its forms, and in some instances algorithms are developed for the location of optima in the region concerned. A few papers deal with control theoretic aspects of optimization. All but two papers are in English. The reviewer's estimate is that about one third of the papers are of direct interest to those concerned more with the computational aspects of optimization.

B. W. CONOLLY (London)