These coefficients are of widely different magnitudes. The largest value of $|\gamma_{ps}|$ for a fixed p occurs near $s = s_0$, where

$$s_0 = \tfrac{1}{2} + \left[\tfrac{1}{4} + \frac{2p^2(p+1)}{4p+1}\right]^{\frac{1}{2}} \simeq \frac{p}{\sqrt{2}}. \quad (A.17)$$

We introduce coefficients $L_p^{(t)}$ useful for discussing the convergence of the iteration process. We may write

$$L_p^{(0)} = \sum_{s=1}^{p} \frac{|\gamma_{ps}^{(0)}|}{s^{2p}} = \frac{2^{2p}}{(2p)!}N_p \quad (A.18)$$

where

$$N_p = 1 - \frac{(2p-1)!!}{(2p)!!} \simeq 1. \quad (A.19)$$

The values of $\gamma_{ps}^{(t)}$ for this mesh ratio sequence may be easily obtained using (A.14), and the value of $L_p^{(t)}$ is given by

$$L_p^{(t)} = \sum_{s=1}^{r} \frac{|\gamma_{ps}^{(t)}|}{s^{2(p+t)}} = L_p^{(0)}\{F_p^{(t)}(1, 4, 9, \ldots p^2)\}^{-1}. \quad (A.20)$$

We should like to acknowledge helpful discussions with Professor J. M. Blatt and Dr. L. M. Delves.

Book Reviews (*continued from p.* 263)

state of progress in U.K. as compared with U.S.A., and it is perhaps sad that, since in the preface to Vol. 2 the editor wrote that Vol. 1 reflects the backward state of automatic programming methods in U.K., we do not seem to have progressed very much further forward.

The paper on RAPIDWRITE describes a worthwhile effort, although it does not present any new information, and most of those who are interested may wish to seek elsewhere for their description The language SEAL comes back for a follow-up from Vol. 2 but one still feels that it is somewhat out in the cold. The problem which yet remains to be solved is to what extent commercial users dare depart from COBOL, and also to what extent a language unique to cne machine can be allowed to propagate a growth of programs which are not interchangeable.

This volume has maintained the standard of its predecessor, also with an increase in price, but the timing of the next volume and the selection of papers still merit all the editor's skill if the publication is to remain fresh. **B. RICHARDS**

Proceedings of a Harvard Symposium on Digital Computers and Their Applications. Edited by A. G. OETTINGER, 1962; 332 pages. (London: *Oxford University Press*, 120s. Cambridge, Mass. *Harvard University Press*)

The Proceedings of the first two Harvard Symposia on digital computers occupy respected places in the libraries of computing laboratories, and this volume, the Proceedings of a Symposium held in April, 1961, may be expected to gain similar acceptance. This Symposium was, however, quite different from the others. Previously the design and hardware aspects of computers had occupied substantial time and so, too, had reports of problems in Numerical Analysis and applications to the physical sciences. This time much greater emphasis has been placed upon the application of computers to the social sciences, and much less upon original contributions in the areas of interest of the first workers on automatic computers. The second difference was in the composition of the Symposium: the others were attended by hundreds of participants from all over the world; 47 people met informally on this occasion and all but a handful of these were Faculty members of Harvard itself. Accordingly, this must have been a much more domestic affair than the earlier ones, and inevitably has sacrificed something of the authority of the earlier Symposia. The variety of topics is so great that it is unlikely that many of such a small gathering fully understood all the papers, or even that many would do so for any particular paper; the reviewer is certainly in no

better position than those attending and he, therefore, cannot comment on all the papers.

Several of the contributions were surveys of possible and actual computer applications in special fields. These papers will be full of interest to someone outside such fields, and yet give valuable guidance and will be a source of useful references for those workers thinking of applying computers to similar problems. The papers on computers in Educational Research, Public Health, X-Ray Crystallography, Medicine, Statistics, Economics, Psychological Research and Business Administration were of this type. Some of the problems mentioned required the application of known techniques—for example, statistical ones—but have awaited the simultaneous occurrence of the right equipment and the right investigator. Other problems posed are those of what E. B. Newman calls paracomputation—non-computational uses of computers. If a criticism is to be levelled here it is that much of what is written is too imprecise to tell a reader how he should proceed on his own machine. Simulation is featured in several papers; one on Queueing Theory and Reservoir Design gives numerical examples of the calculations performed.

There are several papers which show the sorts of differential equations which arise in physical problems, and the numerical methods available for their solution. Examples are given from hydrodynamics, plasma dynamics, kinetics and molecular-beam theory.

Two of the longest papers in the volume deal with document content, one in the context of information retrieval, and the other, by Mosteller and Wallace, about the problem of disputed authorship. The latter work received considerable publicity in the American press because of the great public interest in all matters pertaining to the Constitution. The problem was to determine which of Alexander Hamilton and James Madison wrote certain papers urging the ratification of the Constitution. Even to an Englishman this paper contains a fascinating account of the work by two eminent statisticians to clarify the obscurity of history. They describe the early work, how one of them thought it easy but long, how wives and others counted, how checks were necessary, how first ideas failed to give any indications to the answer, and how finally computer counts yielded data to which their statistical methods might be applied and so point to a conclusive answer.

The editor, who has himself contributed a paper with the intriguing title: "The Geometry of Symbols", is to be congratulated on disciplining his colleagues to such an extent that their accounts only rarely seem to become incomprehensible—a considerable achievement when dealing with material of such interesting diversity. **E. S. PAGE**