## Conclusions

Experience gained in the EOL language proves the possibility of developing a simple symbol manipulation language that is relatively efficient and easy to implement. These results have been made possible by the following features of this language:

Arbitrary form of input and output strings.

Separate device for processing short but complex expressions and for files containing a great amount of information.

Simple format of instructions and the possibility of defining more complex operations by means of procedures, which can be written also in machine language.

Possibility of automatic program modification before its performance.

The experiments we have conducted so far in EOL language application indicate its usefulness, especially for translating from one automatic programming language to another.

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## References

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# Book Review

*The Method of Summary Representation for Numerical Solution of Problems of Mathematical Physics*, by G. N. Polozhii, 1965; 279 pages. (Oxford: *Pergamon Press*, 63s.)

This book describes a method of obtaining a numerical solution of partial differential equations in two or three dimensions. The method appears to be particularly suited to equations with constant coefficients to be solved over rectangular regions. The basis of the method is to replace the derivatives by finite differences, to obtain an analytical general solution of the difference equations, and then to find the arbitrary constants in the general solution so that the boundary conditions are satisfied. To obtain the solution over a rectangle the amount of arithmetic increases only as the number of points round the boundary, and not with the total number of points throughout the region. The solution obtained is an analytical one which need not be evaluated at all the mesh points.

In Chapter 1 there is the theory of the solution of one-dimensional difference equations, of order 2 and of order 4, with constant coefficients, and the relationship of the solution with the latent roots and vectors of certain tri-diagonal matrices. The treatment of this topic could have been shortened with advantage. The method proposed for obtaining the latent vectors of a tri-diagonal matrix, after the latent roots are obtained, is to use the analytical formula for the solution of the first $(n-1)$ homogeneous equations. Under some circumstances this method may give very serious errors in the latent vector due to small errors in the latent root.

In Chapter 2 the two and three-dimensional problems are considered. The general solution of the normal finite difference equations corresponding to Poisson's equation over a rectangle is obtained. From this it is shown how to obtain the particular solution over a rectangle, or a rectangle with a protuberance on one edge, or a region composed of a number of rectangles when the values of the function, or a combination of the function and its normal derivative, are given on the boundary. Other types of equations considered are the biharmonic equation in two dimensions, the parabolic heat diffusion equation in two and three dimensions, and hyperbolic equations in two or three dimensions. Finally in Chapter 2 there is a short section indicating how the method may be generalized to equations with variable coefficients.

In a supplement to the English edition there are some results obtained since the original monograph was published in 1962. An iterative method of solving the equations arising when the solution is required over a region composed of several rectangles is described first; then the method of summary representation, as the mesh size $\to 0$, is shown to be related to the method of integral transforms. Finally some particular problems, including filtration under pressure, bending of beams and plates, are considered.

This book can be recommended to those mathematicians and scientists concerned with the solution of partial differential equations. The method is not well known in this country and may be very valuable under some circumstances. The translation from Russian is first class. No printing errors, apart from those mentioned in the errata list, were noticed.

V. E. PRICE