scale matrix. The matrix B is generally well-conditioned with respect to inversion, so if storage is an overriding concern Gentleman's approach is quite suitable and $Bx = y$ is converted to the system $B^t Bx = \tilde{R}^t D\tilde{R}x = B^t y$ even though we have squared the condition number of the coefficient matrix.

Gill and Murray (1970) and Golub, *et al.* (1972) gave detailed algorithms for updating the factorisation of a matrix due to changes in its elements. Specifically, Gill and Murray discussed updating algorithms due to column and row change in B using elementary Hermitian, and elementary non-unitary matrices. Here we advocate the use of square root-free Givens transformations (Gentleman, 1973) to perform these updates. The number of operations required to solve the new systems $\tilde{B}x = y$, where $\tilde{B}$ differs from B in one row or one column, is proportional to n^2. For example it can be shown that updating the factorisation of B, due to one row change, and solving the new resulting system requires only $5n^2$ multiplications and no square roots, assuming that y is a new right-hand side (Sameh and Bezdek, 1973).

Solving the disaggregation problem can be done by a combination of removing and adding rows and columns considered above.

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Book review

The Development of Coding Theory, edited by E. R. Berlekamp, 1975; 288 pages. (*IEEE Press*, £7·55.)

This is a set of 44 'key' papers in the development of coding theory selected by E. R. Berlekamp. It begins with a penetrating introduction in which he explains his selection criteria. The papers which follow are grouped into five sections each with its own editorial introduction. All these introductions maintain a high standard of clarity and conciseness with historical insights coruscating against a background of formidable but inelectable mathematical erudition. Each ends with lists of further references, there being over 200 in all, though there is some overlap amongst them.

The selection of papers must inevitably invite comparison with that of Blake (Algebraic Coding Theory, *The Computer Journal*, August 1974, p. 210). One obvious difference is that Berlekamp devotes a section of nine papers to convolution codes and sequential decoding, subjects which Blake omitted, and it includes Viterbi's paper on his decoding algorithm. The section on the deconding of block codes includes a reprint of a few pages from Berlekamp's own book which gives his account of the decoding algorithm which he originated. Altogether there are 19 papers common to Berlekamp and Blake with the greatest measure of agreement being in the early work (Hamming, Golay etc), the BCH codes and the weight spectra (MacWilliams, Pless).

My only quibble is that all six papers by Russian authors are reproduced in the original Russian and only one of these (Vasil'yev) seems to be readily available in English translation. The other five, including two papers by Goppa, are from the journal *Problemy Peredachi Informatsii* (Problems of Information Transmission). Berlekamp himself is obviously aware of the language problem for in the abstract to his own paper explaining the Goppa codes (IEEE Trans IT-19, Sept 1973) he writes, '. . . This paper is a summary of Goppa's work which is not yet available in English'. The didactic value of the book would surely have been increased by giving all the Russian papers in English translation as was in fact done by Blake.

Finally I remain puzzled over the audience for which expensive books of reprinted papers, such as this one, are intended. No doubt libraries will find it useful to have such selections available but I find it very difficult to identify the personal purchaser. Berlekamp himself makes only modest claims; in his preface he writes, and I cannot impove on either his words or his judgement, '. . . If one's primary objective is to learn the subject matter, then a volume such as this one is not a partucularly good way of going about it. . . However, if one is more interested in a general impression about where coding theory has come from and how it has arrived in its present state then this book is a good place to start'.

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