ilevskiĭ (where the author uses the "matrices of the second degree" that he had introduced in his thesis, a generalization of the reviewer's "elementary matrices"), reduction to triple-diagonal form, again by means of the matrices of second degree, Lanczos, and Givens. All these are methods of reduction. Finally come the power methods (but not backward, or the Rayleigh quotient), deflation, Jacobi, and LR, but QR receives only three lines at the end with a reference to Francis, who is named in the original but not in the translation.

It is a pity that the French consider an index of no value, and there is none in either the original or the translation. But apart from these minor quibbles, the translation is very good and the book fulfills its purpose excellently well.

A. S. H.

5 [3].—J. K. Reid, Editor, *Large Sparse Sets of Linear Equations*, Academic Press, New York, 1971, x + 284 pp., 24 cm. Price $16.00.

It is by no means uncommon that workers in disjoint fields will be faced with similar computational requirements, and that each group will develop its own techniques in ignorance of those developed by the others. A classical, and one might say glaring, example, is the method for finding eigenvalues proposed by the astronomer Leverrier in 1840, and rediscovered independently about a century later by a statistician, a psychometrician, and several mathematicians, admittedly with some improvements, even though Krylov in 1931 had described a method that was far superior.

The efficient handling of sparse matrices, a rather broader field, is another example. In 1968, a symposium was held at IBM, Yorktown Heights, in an attempt to establish communication, and a second took place there in the late summer of 1971. This volume reports the proceedings of a similar conference held at Oxford in April of 1970. The volume concludes with a somewhat discursive paper by Ralph A. Willoughby describing work at IBM and the organization of the 1968 symposium.

Principal subject matter areas represented here are structural analysis, power systems, linear programming and (more generally) optimization, and geodetics. Not surprising is the fact that Kron's "tearing", later formalized in what the reviewer calls "the method of modification", appears several times. One paper is devoted to "bi-factorisation", which is the simultaneous application on the left and on the right of what the reviewer calls "elementary matrices", those on the left differing from the identity only below the diagonal in one column, those on the right differing only to the right in one row. Joan Walsh gives a survey of direct and indirect (iterative) methods, Frank Harary discusses the use of graph theory, the editor (whose name is modestly omitted in the table of contents) discusses the method of conjugate gradients.

Some of the discussion following each paper is included, somewhat edited, as the editor confesses, and assuredly to the reader's benefit.

To develop a unified theory here may be impossible, and I, personally, was surprised to find as much unity and coherence in these papers as I did, and certainly for those interested in the subject, this volume is essential.

A. S. H.