Translator's Preface to the Russian Edition of FGDP*

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The development of computational techniques and numerical methods of analysis has opened up broad areas where these techniques and methods can be applied to increase the effectiveness of the solution of geophysical inverse problems. It is possible to say, without exaggeration, that great progress in exploration geophysics is imposssible without widely introducing into exploration work the latest methods for the machine processing of geophysical data.

It has been about eight years now since the first Russian-language books on the computer processing of seismic traces were published. This has been a time of rapid development for computer methods of geophysical, and especially seismic, data processing. New trends in the theory and practice of geophysical data processing have been reflected in the series of native and translated works of recent years. Among these should be mentioned the monograph *The Theory and Practice of Numerical Signal Processing* by P. Rabiner and B. Gould (Mir Publishers, 1978), *Linear Processing Systems in Seismic Exploration* by I. K. Kondrat'ev (Nedra Publishers, 1976), *Seismic Impulse Holography* by Yu. V. Timoshin (Nedra Publishers, 1978), and others. The book presented here, by the well-known American scholar Jon F. Claerbout, represents a sufficiently systematized exposition of current methods of computerized geophysical data processing.

In this book there are sequentially laid out the ideas and methods of discrete analysis and matrix algebra, as well as methods of processing geophysical data, ranging from the various types of one- and two-dimensional filters to the solution of the inverse problem by means of partial differential equations and their finite-difference analogs. The limited size

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of the book, and its high concentration of various facts, naturally contributes to the fact that in it many assertions are made without proof. This, however, so it seems, is the only way to produce a sufficiently complete guide to the processing of geophysical data as a whole. Apart from this, the book is very useful for the reader who can independently analyze the methods, ideas, and proofs that are presented. Towards this end, numerous problems are given, placed at the end of almost every section. Some of these problems are very easy, while others are extremely difficult. The latter usually are provided with hints, making the solution easier. Despite its comparatively small size and the sketchiness of its exposition in many places, this book, while fully elucidating the current state of the theory and practice of computerized geophysical data processing, gives a good deal of attention to an examination of mathematical methods: the theory of discrete analysis and statistics, the theory of matrices and least-square methods, and so on. All of this prepares the reader to understand more complex mathematical problems in computerized geophysical data processing.

The book has a strongly-expressed engineering approach -- in it are 11 Fortran programs which can carry out the principle procedures of processing data. Int this book the advantages of a textbook and a monograph are successfully combined. This allows one to hope that it will attract the attention of a wide circle of geophysical specialists: engineers, scientific workers, teachers, and university students.