

Introduction to the research papers

There are several reasons to include a number of research papers in a book which has a mainly surveying character. One of the reasons is to draw the attention of the reader to a line of research which otherwise might have escaped her or his attention.

The paper by Rafel for instance, discusses a well-known method, a combination of Galerkin approximation and averaging, applied to nonlinear wave equations. The novel feature is that the correctness of the formal method can be proved; by way of illustration an explicit problem has been treated. A similar reason holds for the paper by Dragan which constitutes an original contribution and helps us to keep in touch with some of the East-European literature.

Other reasons for publishing in this book hold for the papers by Grasman/Matkowsky and van der Burgh. These papers are expected to start off a number of interesting research papers in mathematical biology and nonlinear wave theory.

The text provided by Bogaevsky and Povzner serves as a kind of forerunner of a book in preparation. The perturbation method introduced by the authors is formal but we note that the use of normalisation of operators agrees with the normalisation procedure accepted for vector fields. The paper has been written in an uncompromising compact style and as one of the authors remarks in a letter: "in this kind of work, what is most needed is a large quantity of examples." These examples one shall find in the forthcoming book.

The paper by Eckhaus has been written in an expository style while resolving a number of questions existing in the literature. In this paper it is shown that special periodic solutions, ducks, found by a group of mathematicians working in the field of nonstandard analysis, can be studied by standard methods of asymptotic analysis. Moreover the notoriously complicated problem of the asymptotics of relaxation oscillations has been simplified considerably.

Summarizing our introduction to the research papers in PART 3 we may say that these papers are settling old questions in the literature and are opening up new lines of research both in the field of methods in applied mathematics and in applications.