FOREWORD

The papers included in this book were read at the All-Union workshop on 'Excited Polaron States in Condensed Media' held in Pushchino, USSR, in 1989.

Polarons represent a particular phenomenon among other condensed states known to physicists, such as excitons, phonons, magnetons, etc. The mathematical tools used in the polaron theory are not customary for quantum mechanics, since the problem is formulated as non-linear quantum-mechanical.

The 'offbeat' character of the situation was fully appreciated after the appearance of the notable papers by Bogolyubov and Tyablikov in which the polaron problem was treated as a simple case of particle interacting with the quantum field.

It is noteworthy that within the framework of strong-coupling particle-field interaction, the present-day perturbation methods developed for the weak-coupling interaction theory do not apply. This approach has acquired a particular significance at present due to the appearance of many non-perturbation theories in particle physics.

The book comprises both reviews and articles containing original results in the topical sections of polaron theory and related problems.

Now it has become obvious that quite a number of approaches in polaron studies can succeed only if adequate computational methods and program packages for solution of non-linear boundary problems of mathematical physics are developed. For this reason the Editors have deemed it proper to include papers devoted to the development of this line.

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