

Preface

Solutions to problems in quantum mechanics are important for scientists, engineers and many others. This book gives a collection of most standard methods in quantum mechanics together with their programs in SymbolicC++, Maxima, Mathematica and Maple. Advanced topics in quantum mechanics are also included. In most cases the output of the programs is also displayed. Most of the problems are implement in SymbolicC++ and Maxima. For a number of selected problems the program are implemented in Mathematica, Maple and C++. In the first edition the programs had been implemented in Reduce.

SymbolicC++, Maxima, Reduce, Mathematica and Maple are the most widely available and simple to use computer algebra systems. They enable users to manipulate algebraic expressions and equations symbolically. For example, we can differentiate and integrate symbolically. Number crunching can also be done. Moreover, symbolic manipulation and number crunching can be combined in one program.

Beside the standard methods, modern developments in quantum mechanics are also included. These include Bose operators, Fermi operators, coherent states, squeezed state, gauge theory, quantum groups and super Lie algebras. All the special functions (such as Hermite, Chebyshev, Legendre) important in quantum theory and Hilbert space theory are also implemented.

The level of presentation is such that one can study the subject early on in ones education in science. There is a balance between practical computation and the underlying mathematical theory. The book is ideally suited for use in a quantum mechanics lecture.

The web sites for the different packages are:

Maxima: <http://maxima.sourceforge.net>

SymbolicC++: <http://issc.uj.ac.za>

Reduce: <http://reduce-algebra.sourceforge.net>

Maple: <http://www.maplesoft.com>

Mathematica: <http://www.wolfram.com>

Without doubt, this book can be extended. If you have comments or suggestions, we would be pleased to have them. The email addresses of the authors are:

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