Preface

In this book we present some topics in coding theory, which we consider to be particularly important and interesting, both from the point of view of theory and applications. Some of the results are new, most are not, but the choice of subjects reflects a part of the development of coding theory through the last decade. Thus some classical results have been omitted, and several recent results are included. However the presentation is new in many places.

We have kept the amount of detail at a minimum. Only the necessary mathematics is presented, the coding constructions are concentrated on the most important techniques, and decoding algorithms are presented in their basic versions. However, we have included proofs of all essential results.

The aim has been to make the book a suitable starting point for independent investigations in the subject. The learning of the basic tools is supported by many problems, and there are there are more advanced problems and project suggestions for continuing in the direction where the reader has particular background and interest. This also means that in order to fully understand the subject, it is essential to solve the problems and work on the projects. In Appendix B we give solutions to some of the problems, and instructors can get the complete set of solutions from us. We strongly suggest that the problems are supplemented by computer excersices, and in most cases the projects will require a small amount of programming. On the web page of the book we give examples of excercises in maple® and MATLAB®.

The book grew out of a course at The Technical University of Denmark (covering one third of a semester) and is written for an audience of primarily graduate or advanced undergraduate students. It requires some background in elementary linear algebra and algorithms. Some background in computer science or electrical engineering will also facilitate the understanding, but mostly a certain maturity is needed.

We have not included references in the text, since we do not expect them to be of immediate use to the reader. However, there is an annotated bibliography and references to other resources for further study. Many students have helped in improving the text, in particular we want to acknowledge the important effort by Bergþór Jónsson.

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