Code Design for Dependable Systems: Theory and Practical Applications

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Theoretical and practical tools to master matrix code design strategy and technique

Error correcting and detecting codes are essential to improving system reliability and have popularly been applied to computer systems and communication systems. Coding theory has been studied mainly using the code generator polynomials; hence, the codes are sometimes called polynomial codes. On the other hand, the codes designed by parity check matrices are referred to in this book as matrix codes. This timely book focuses on the design theory for matrix codes and their practical applications for the improvement of system reliability. As the author effectively demonstrates, matrix codes are far more flexible than polynomial codes, as they are capable of expressing various types of code functions.

In contrast to other coding theory publications, this one does not burden its readers with unnecessary polynomial algebra, but rather focuses on the essentials needed to understand and take full advantage of matrix code constructions and designs. Readers are presented with a full array of theoretical and practical tools to master the fine points of matrix code design strategy and technique:
* Code designs are presented in relation to practical applications, such as high-speed semiconductor memories, mass memories of disks and tapes, logic circuits and systems, data entry systems, and distributed storage systems
* New classes of matrix codes, such as error locating codes, spotty byte error control codes, and unequal error control codes, are introduced along with their applications
* A new parallel decoding algorithm of the burst error control codes is demonstrated

In addition to the treatment of matrix codes, the author provides readers with a general overview of the latest developments and advances in the field of code design. Examples, figures, and exercises are fully provided in each chapter to illustrate concepts and engage the reader in designing actual code and solving real problems. The matrix codes presented with practical parameter settings will be very useful for practicing engineers and researchers. References lead to additional material so readers can explore advanced topics in depth.

Engineers, researchers, and designers involved in dependable system design and code design research will find the unique focus and perspective of this practical guide and reference helpful in finding solutions to many key industry problems. It also can serve as a coursebook for graduate and advanced undergraduate students.

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