

Error-Correcting Codes: *Practical Origins and Mathematical Implications*



Dr. Vera Pless

University of Illinois at Chicago

Abstract

Mathematicians have been fascinated with the theory of error-correcting codes since the publication of Shannon's classic papers fifty years ago. With the proliferation of communications systems, computers, and digital audio devices that employ error-correcting codes, the theory has taken on practical importance in the solution of coding problems. This solution process requires the use of a wide variety of mathematical tools and an understanding of how to find mathematical techniques to solve applied problems.

The practical problem underlying coding theory is the efficient and accurate transmission of information from one place to another.

Practical uses at present include the high-fidelity on compact disc recordings, the transmission of financial information, data transfer from one computer to another or from memory to a central processor and information from a distinct source such as weather or communications satellites. Error-correcting codes deal with the problem of detecting and correcting transmission errors caused by noise on a channel. We give all the basic definitions and show how codes can correct errors.

Dr. Pless received an undergraduate degree from the University of Chicago and her Ph.D from Northwestern in 1957. She worked as a researcher for the the Air Force Cambridge Research Laboratory, where she learned about coding theory during the early stages of its development. Dr. Pless joined the University of Illinois-Chicago's department of Mathematics, Statistics and Computer Science as a full professor in 1975.

She has published over 120 papers and co-edited the 2169-page *Handbook of Coding Theory*. Dr. Pless is author of *An Introduction to the Theory of Error-Correcting Codes*, a highly respected coding theory text that is in its third edition.

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**Middleton Auditorium
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