Metal Vapor Arcing Risk Assessment Tool

Lyndon B. Johnson Space Center, Houston, Texas

The Tin Whisker Metal Vapor Arcing Risk Assessment Tool has been designed to evaluate the risk of metal vapor arcing and to help facilitate a decision toward a researched risk disposition. Users can evaluate a system without having to open up the hardware. This process allows for investigating components at risk rather than spending time and money analyzing every component. The tool points to a risk level and provides direction for appropriate action and documentation.

This process was written by Monika C. Hill of The Boeing Company and Henning W. Leidecker of Goddard Space Flight Center for Johnson Space Center.

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act {42 U.S.C. 2457(f)}, to The Boeing Company. Inquiries concerning licenses for its commercial development should be addressed to:

Boeing Licensing Professional,
Terrance Mason
E-mail : terrance.mason@boeing.com
Phone No.: (562) 797-9034.
Reference Boeing Docket No. 06-0756.
Refer to MSC-24300, volume and number of this NASA Tech Briefs *issue, and the page number.*

# Performance Bounds on Two Concatenated, Interleaved Codes

It is now possible to calculate tight bounds at high SNR.

NASA's Jet Propulsion Laboratory, Pasadena, California

A method has been developed of computing bounds on the performance of a code comprised of two linear binary codes generated by two encoders serially concatenated through an interleaver. Originally intended for use in evaluating the performances of some codes proposed for deep-space communication links, the method can also be used in evaluating the performances of short-block-length codes in other applications.

The method applies, more specifically, to a communication system in which following processes take place:

- At the transmitter, the original binary information that one seeks to transmit is first processed by an encoder into an outer code (C_o) characterized by, among other things, a pair of numbers (n,k), where n $(n > k)$ is the total number of code bits associated with k information bits and n–k bits are used for correcting or at least detecting errors. Next, the outer code is processed through either a block or a convolutional interleaver. In the block interleaver, the words of the outer code are processed in blocks of I words. In the convolutional interleaver, the interleaving operation is performed bit-wise in N rows with delays that are multiples of B bits. The output of the interleaver is processed through a second encoder to obtain an inner code (C_i) characterized by (n_i,k_i).
- The output of the inner code is transmitted over an additive-white-Gauss-
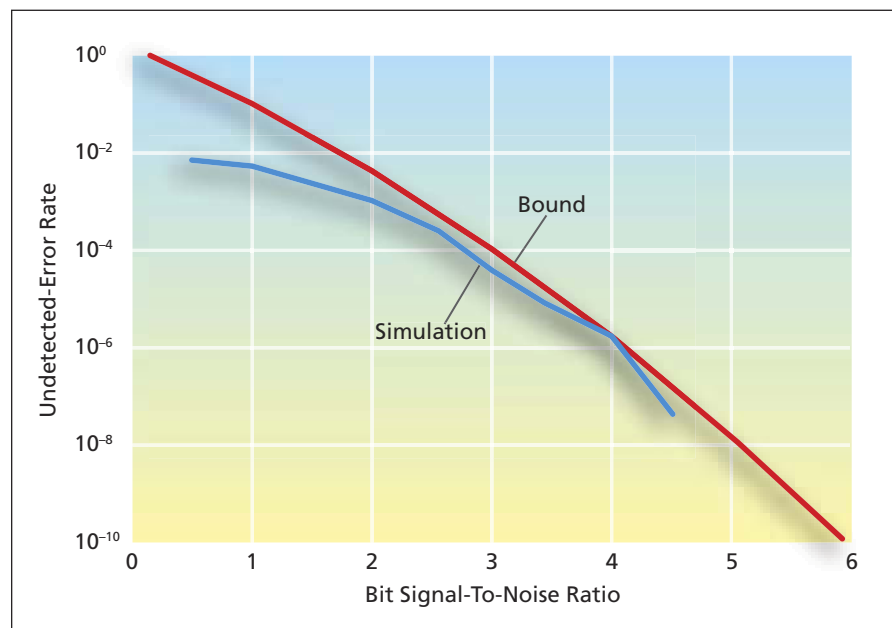
The **Undetected-Error Rate** of one of the coding/decoding communication systems studied in this research was determined by computational simulation and is compared here with the upper bound on the undetected-error rate calculated by the present method.

ian- noise channel characterized by a symbol signal-to-noise ratio (SNR) E_s/N_o and a bit SNR E_b/N_o.
- At the receiver, an inner decoder generates estimates of bits. Depending on whether a block or a convolutional interleaver is used at the transmitter, the sequence of estimated bits is processed through a block or a convolutional de-interleaver, respectively, to obtain estimates of code words. Then the estimates of the code words are processed through an outer decoder, which generates estimates of the original information along with flags indicating which estimates are presumed to be correct and which are found to be erroneous.

From the perspective of the present method, the topic of major interest is the