NEW SPACE-TIME BLOCK CODING SCHEMES

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Abstract

In this talk, I will describe some of our recent results in the area of space-time block coding (STBC). First, I'll present a new rate-1 diversity-4 complex orthogonal non-linear STBC. This code is a generalization of the famous Alamouti code to 4 Transmit antennas. For QPSK modulation, it enjoys low-complexity maximum likelihood decoding and no constellation expansion. Performance results for the WiMAX application will be presented and discussed. Then, I'll describe a new class of space-time codes which we call diversity-embedding space-time codes where a low-diversity code is embedded within a high-diversity code. This allows a form of wireless communication where the high-rate code opportunistically takes advantage of good channel realizations while the embedded high-diversity code ensures that at least part of the information is decoded reliably. For multimedia transmission, these codes allocate different diversity levels to the different information layers (video, voice, real-time data, etc..) according to their QoS requirements.

Bio

Dr. Naofal Al-Dhahir received his MS and PhD degrees from Stanford University in 1990 and 1994, respectively, in Electrical Engineering. He was an Instructor at Stanford University in 1993. From August 94 to July 99, he was a member of the technical staff at GE R&D Center in NY where he worked on various aspects of satellite communication systems design and anti-jam GPS receivers. From August 99 to July 03, he was a principal member of technical staff at AT&T Shannon Laboratory in Florham Park, NJ where he worked on space-time coding and signal processing. Currently, he is an Associate Professor at the University of Texas at Dallas. His current research interests include space-time coding and signal processing, OFDM, wireless networks, and digital subscriber line technology. He has authored over 130 journal and conference papers and holds 13 US patents. He is a Senior Member of the IEEE and a member of the IEEE SP4COM and SPTM technical committees. He served as Editor for IEEE Transaction on Signal Processing and IEEE Communications Letters. He is currently an Editor for IEEE Transactions on Communications. He is co-author of the book Doppler Applications for LEO Satellite Systems, Kluwer 2001.
