DOUBLY DIFFERENTIAL DETECTION OF D 2 BPSK IN CDMA SYSTEM

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ABSTRACT

IT IS WELL KNOWN THAT CLASSICAL DIFFERENTIAL DETECTION OF MPSK SIGNALS, WHEREIN THE INFORMATION IS ENCODED AS A FIRST ORDER PHASE DIFFERENCE, IS A SIMPLE AND ROBUST FORM OF COMMUNICATION IN ENVIRONMENTS NOT SUBJECT TO FREQUENCY VARIATION. FOR CHANNELS THAT INTRODUCE INTO THE CARRIER A RANDOM FREQUENCY SHIFT, E.G., THOSE ASSOCIATED WITH MOVING VEHICLES, CLASSICAL DIFFERENTIAL DETECTION AS ABOVE MAY YIELD POOR PERFORMANCE, PARTICULARLY IF THE FREQUENCY SHIFT IS AN APPRECIABLE FRACTION OF THE DATA RATE. IN SUCH SITUATIONS, ONE MUST RESORT TO A FORM OF DIFFERENTIAL DETECTION THAT ENCODES THE INFORMATION AS A HIGHER ORDER (SECOND-ORDER FOR CONSTANT FREQUENCY OFFSET) PHASE DIFFERENTCE PROCESS. THE SUBJECT OF THIS PAPER IS THE IMPLEMENTATION AND PERFORMANCE OF SUCH DOUBLY DIFFERENTIAL DETECTION SYSTEMS AND A COMPARISON WITH MORE WELL-KNOWN CLASSICAL (SINGLE DIFFERENTIAL DETECTION) SYSTEMS. IN THIS THESIS WORK, DIFFERENT DIGITAL BASEBAND REALIZATIONS OF RAKE REVEIVERS IN A DIRECT SEQUENCE SPREAD SPECTRUM (DS-SS) COMMUNICATIONS SYSTEM FOR HIGH DATA RATES HAVE BEEN MODELED, AND THEIR PERFORMANCE HAS BEEN SIMULATED. THE APPLIED SYMBOL MODUATION SCHEME IS DOUBLY DIFFERENTIAL BINARY SHIFT KEYING (D 2 PSK). THE PERFORMANCE IS SIMULATED FOR SPREAD SPECTRUM COMMUNICATION ON FREQUENCY-SELECTIVE RAYLEIGH FADING CANNELS, AWGN CHANNEL AND FREQUENCY OFFSET CHANNEL. IT IS DEMONSTRATED THAT THE PROPOSED DEMODULATOR IS ATTRACTIVE IN FREQUENCY OFFSET CHANNEL WITH HIGHER DOPPLER FREQUENCY, BUT NOT SUITABLE IN RAYLEIGH FADING AND AWGN CHANNEL. THE MOST INTERESTING PERFORMANCE MEASURE OF A COMMUNICATIONS SYSTEM IS THE BIT ERROR RATE (BER) THAT IS TREATED AS A FUNCTION OF THE MEAN SIGNAL-TO-NOISE RATIO (SNR). THE BER HAS BEEN INVESTIGATED BY MONTE CARLO SIMULATION.

Keywords : 無

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