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Performance Analysis Of MSK System In Inteference Environments

رسالة

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LIST OF ABBREVIATIONS

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ACI	ADJACENT CHANNEL INTERFERENCE.
a_{k1}	UNCORRELATED INPHASE SYMBOL TAKING VALUES ± 1 WITH EQUAL PROBABILITY.
AWGN	ADDEDITIVE WHITE GAUSSIAN NOISE
B_{eq}	NOISE EQUIVALENT BANDWIDTH .
B_R	NORMALIZED DOUBLE SIDED RECEIVER BANDWIDTH.
B_T	NORMALIZED DOUBLE SIDED TRANSMITTER BANDWIDTH.
BW	BANDWIDTH.
CCI	CO-CHANNEL INTERFERENCE.
C/I	CARRIER TO INTERFERENCE RATIO.
C/N	CARRIER TO NOISE RATIO.
E_b	BIT ENERGY.
$\text{erf}(x)$	ERROR FUNCTION.
erfc	COMPLEMENTARY ERROR FUNCTION.
f_o	TRANSMITTER CARRIER FREQUENCY.
f_b	BIT RATE.
f_r	receiver carrier frequency.
f_s	SYMBOL RATE.
f_{sk}	FREQUENCY SEPARATION BETWEEN ADJACENT CHANNELS.
h_o	IMPULSE RESPONSE OF TRANSMITTER FILTER .
h_D	IMPULSE RESPONSE OF SAMPLING DETECTOR.
h_r	IMPULSE RESPONSE OF RECEIVER FILTER.
I_o	INTERFERENCE TERM.
ISI	INTERSYMBOL INTERFERENCE.
MSK	MINIMUM SHIFT KEYING.

$n(t)$	STATIONARY WHITE GAUSSIAN NOISE.
N	NUMBER OF POLES OF THE FILTER.
N_0	SINGLE SIDED NOISE POWER SPECTRAL DENSITY.
NRZ	NON RETURN TO ZERO.
OQPSK	OFFSET QUADRATURE PHASE SHIFT KEYING.
P_e	PROBABILITY OF ERROR.
$P(t)$	SHAPING FUNCTION OF TRANSMITTED SIGNAL.
QCI	QUADRATURE CHANNEL INTERFERENCE.
QPSK	QUADRATURE PHASE SHIFT KEYING.
$r_I(t)$	INPHASE RECEIVED SIGNAL.
r_Q	QUADRATURE RECEIVED SIGNAL.
S/I	SIGNAL TO INTERFERENCE RATIO.
T_b	BIT DURATION.
T_s	SYMBOL DURATION.

LIST OF SYMBOLS
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β	EXCESS BANDWIDTH.
α	PHASE DIFFERENCE BETWEEN TRANSMITTER AND RECEIVER.
Φ_o	PHASE OF TRANSMITTER CARRIER FREQUENCY.
Φ_r	PHASE OF RECEIVER CARRIER FREQUENCY.
τ_k	RANDOM SYMBOL TIMING MISALIGNMENT (JITTER).
σ_n	ROOT MEAN SQUARE VALUE OF THE NOISE VOLTAGE.

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ABSTRACT

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The ever increasing demand for digital transmission channels in the radio frequency (RF) band presents a potentially serious problem of spectral congestion and is likely to cause severe adjacent and cochannel interference problems.

Minimum shift keying (MSK) is an excellent modulation technique for digital links when bandwidth conservation and the use of efficient amplitude saturating transmitters are important requirements.

In this thesis, a review of MSK system evaluation by analytical model is presented. The presented model takes into consideration the digital communication channel impairments such as thermal noise, which is modeled as additive Gaussian noise, the filtering effect which cause intersymbol interference (ISI), and quadrature channel interference (QCI). Also the adjacent channel interference (ACI) and cochannel interference are taken into consideration in the model. The resulting probability of error is studied for special cases of combinations of types of interference.

The computation results of probability of error (P_e) versus the signal to noise ratio for different interference environments as a parameter are shown, from which effect of different parameters are investigated.

Comparisons between the results of our computation and other quaternary digital modulation systems (QPSK, OQPSK), previous published results, assure the superiority of the MSK system in interference environments also.

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