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# Performance Analysis Of MSK System In Inteference Environments



A THESIS SUBMITTED IN PARTIAL FULLFILMENT
OF THE M.SC DEGREE IN
ELECTRONICS AND COMMUNICATIONS
ENGINEERING



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1993

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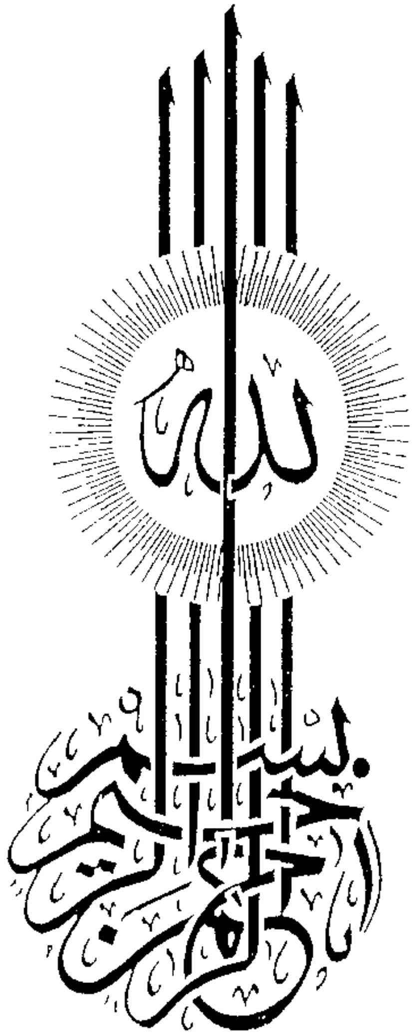
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## ACKNOWLEDGMENT

All gratitude is due to ALLAH.

I wish to express my sincere appreciation and gratitude to prof Dr. HADIA EL-HENAWEE because of her guidance, helpful suggestions, valuable comments and continuous encouragement during all phases of the work.

I owe a real and unlimited depth of gratitude and appreciation to Dr. REFAAT H. EL-ZANFALY for following up this work, his patience, excellent supervision, fruitful discussions and deep interest during all phases of research.

My gratitude and thanks to all my friends who helped me for fulfillment of this thesis.

Lastly, I offer a special gratitude to my mother and my wife for their valuable assistance.

## *LIST OF* ABBREVIATIONS

| | |
|---|---|
| ACI | ADJACENT CHANNEL INTERFERENCE. |
| $a_{ki}$ | UNCORRELATED INPHASE SYMBOL TAKING VALUES ± 1 WITH EQUAL PROBABILITY. |
| AWGN | ADDEDTIVE 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. |
| Eb | BIT ENERGY. |
| 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. |
| $N_o$ | 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

| | |
|---|---|
| $\beta$ | EXCESS BANDWIDTH. |
| $\alpha$ | PHASE DIFFERENCE BETWEEN TRANSMITTER AND RECEIVER. |
| $\Phi_o$ | PHASE OF TRANSMITTER CARRIER FREQUENCY. |
| $\Phi_r$ | PHASE OF RECEIVER CARRIER FREQUENCY. |
| $\tau_k$ | RANDOM SYMBOL TIMING MISALIGNMENT ( JITTER ). |
| $\sigma_n$ | ROOT MEAN SQUARE VALUE OF THE NOISE VOLTAGE. |

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## ABSTRACT

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 sever 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 (Pe) 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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