

MASTER OF SCIENCE IN SYSTEMS ENGINEERING

**TIME DOMAIN SIMULATION OF M-ARY FREQUENCY SHIFT KEYING (MFSK)
COMMUNICATIONS SYSTEM PERFORMANCE IN THE PRESENCE OF
WIDEBAND NOISE AND CO-CHANNEL INTERFERENCE**

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In this thesis models of MFSK digital communications systems were developed using Matlab Simulink and Communications Toolbox. The models were employed to verify MFSK performance in the presence of additive noise and predict MFSK performance for additive noise and co-channel interference. Results are presented for bit-error rate as functions of the signal-to-noise and signal-to-interference power ratios. The results for coherent detection of MFSK ($M=2,4,8$) in the presence of additive white Gaussian noise show excellent agreement with the theory. On the other hand, simulation results for the probability of bit error for non-coherent detection of MFSK differ (-21% average) from the theory suggesting a possible "systematic" error in the Communications Toolbox implementation of the non-coherent MFSK detection.

DoD KEY TECHNOLOGY AREA: Command, Control, and Communications

KEYWORDS: Simulink, Communications Toolbox, M-ary Frequency Shift Keying (MFSK), Coherent-Non-Coherent Detection