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Faculty of Engineering
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Junior
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ECE252 – Fundamentals of Communication Systems

Sheet #4

Angle Modulation using Octave

FM transmitter

1. Using a FM Transmitter (Tx), a sinusoidal signal ($A_m = 1$ and $f_m = 100Hz$) is transmitted using a carrier of frequency $f_c = 10kHz$, $k_f = 10$.
   a) Plot the baseband signal and the modulated signal versus time.
   b) Plot the spectrum of the baseband signal and the modulated signal. Compare the peaks values with what is expected from your analysis.
   c) Estimate the BW using universal method and compare results with Carson's rule
   d) Repeat the problem using $k_f = 100$ $A_m = 10$

FM transceiver

2. Using a FM Transmitter (Tx), a sinusoidal signal ($A_m = 1$ and $f_m = 100Hz$) is transmitted using a carrier of frequency $f_c = 1kHz$, $k_f = 10$.
   a) Design a FM transmitter. Plot the time domain signal and its corresponding spectrum
   b) Design a FM receiver

Channel non-linearities

3. Given a non-linear channel $v_{out} = v_{in} + 0.5\, v_{in}^2 + v_{in}^3$, $m(t) = \cos(2\pi 100t)$, $f_c = 1kHz$. Compare the performance in the following cases:
   a) AM: $k_a = 0.5$
   b) FM: $k_f = 10$