Zewail City for Science and Technology
Nanotechnology Engineering Program
Course Project

NANENG 461
Communication Theory and Systems
Spring 2020

1 Using MATLAB

1.1 Required Task

- Generate the message signal $x(t)$, shown in Fig. 1, and plot it.

Note that the amplitude of the signal is 1 Volts and its period is 1 ms. You need to generate only 2 cycles of the signal.
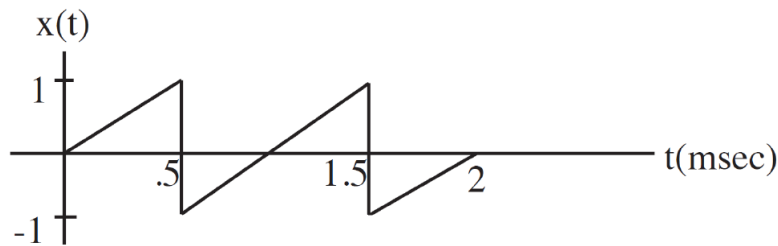

Figure 1: Message signal $x(t)$

- Generate an FM signal of the phase deviation signal using a carrier wave of 1 Volt amplitude and 10 KHz frequency. Plot this signal and comment on it.

- Repeat the last step for $K_f = 3000$ and $K_f = 5000$. Comment on the plots you obtain.

1.2 Deliverables

1. Source codes (.m files) to generate the required signals.

2. Figure plots (.fig files) of the required signals.

3. A .pdf file of the whole report, including the figures, properly labeled and titled. The report should also include your comments.

2 Using Simulink

2.1 Required Task

- Repeat Part 1 using Simulink.

Hints: Use **simin** block to use the message signal defined in your workspace.

Use a multi-input scope to show the message signal, the phase deviation signal and the modulated signal on the same graph.

- Repeat step 1 for a sinusoidal message signal with an amplitude of 1.5 volts and a frequency of 2 KHz.

2.2 Deliverables

1. Block diagram of your system in Simulink.

2. Parameters of each block used in the system.

3. Scope outputs for triangular and sinusoidal message signals.

4. A .pdf file of the whole report, including the figures, properly labeled and titled. The report should also include your comments.

3 Using Simulink Toolboxes

3.1 Required Task

Using the "FM Modulator" block from "Communications" toolbox, verify your findings from Part 2.

3.2 Deliverables

1. Block diagram of your system in Simulink.

2. Parameters of each block used in the system.

3. Scope outputs for triangular and sinusoidal message signals.

4. A .pdf file of the whole report, including the figures, properly labeled and titled. The report should also include your comments.

4 Deadlines

- **Full submission deadline**: April 25, 2020 at 11:59 PM

5 Course Project Rules

- This is an team project, teams can be composed of $3 - 5$ students.

- All team members are accountable for all project parts.

- Team reports (including source codes, figures or comments) are not to be shared with others, neither before nor after submission. However, in person discussions are encouraged.

- Any copied reports, either fully or partially, will receive **Zero** points. This applies to both the original and the copy.

- No late submissions are allowed.

- In submission, you have to submit .m files separately. In addition, the figure should be submitted in .fig format and should be included in the .pdf report. Reports should be comprehensive and readable on their own.

- The .pdf report is the main document to be evaluated, i.e. no credit is given for the source codes. However, source codes are to be checked against plagiarism.

- Grading will depend on:

  - Completeness and correctness of deliverables (as per the .pdf report): 50%
  - Clarity of figures, and proper labeling (as per the .pdf report): 40%
  - Report writing and organization: 10%