

# Introduction to Time-Varying Electrical Networks : Week 8

## Problem 1

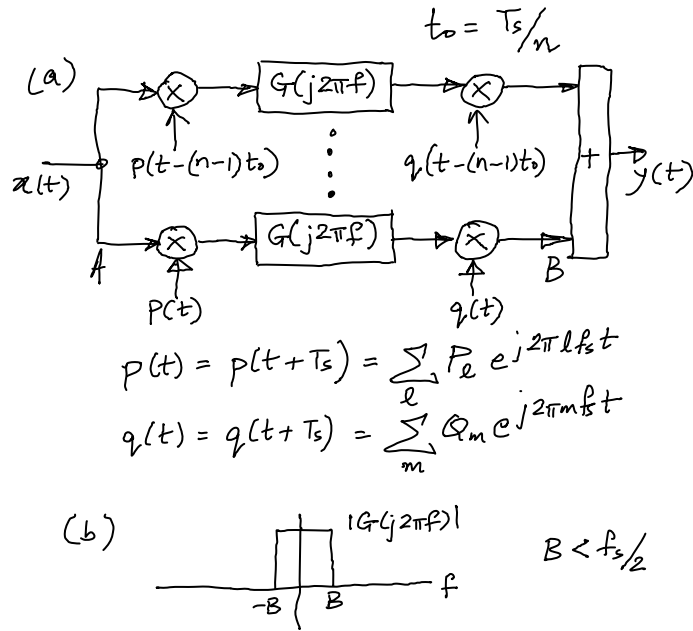


Figure 1: n-path system.

The figure above shows an n-path system.  $G$  represents an LTI system.

- Determine an expression for the harmonic transfer functions  $H_k(j2\pi f)$  of one arm of the system (between A and B).
- Assuming that  $|G|$  is as shown in part (b) of the figure, draw a qualitative picture of  $|H_k(j2\pi f)|$ .
- Next, determine the harmonic transfer functions  $\hat{H}_k(j2\pi f)$  of the n-path system.

## Problem 2

Determine the harmonic transfer functions of the system of Fig. 2, assuming  $\alpha$  and  $t_o$  are 0. What do you notice? Next, evaluate the HTFs for small, non-zero  $\alpha$  but  $t_o = 0$ . Repeat for  $\alpha = 0$  but small non-zero  $t_o$ .

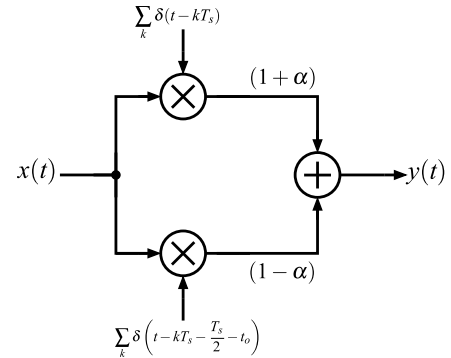


Figure 2: System in Problem 2.