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LAB 2 TASK 2 - CHANGE THE TRANSMISSION DISTANCE (1/1 point)

In this task, you will investigate the effect of the transmission distance on the communications system.
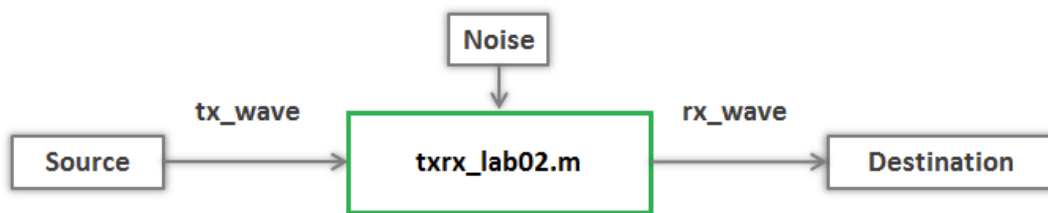
The code window below contains a MATLAB script similar to that of Task 1. Your task here is to investigate the effect of the transmission distance by fitting the step responses with different transmission distances.

```
1  tx_wave = [zeros(1,150) ones(1,250)];   % define step-like waveform
2  distance_list = [10 20 30];             % list of distances to simulate
3  num_dist = length(distance_list);
4  mse_list = zeros(1,num_dist);
5
6  % parameters of best fits for each distance
7  % modify these to find the best fit at each distance
8  c_list = [0.23 0.25 0.26];
9  d_list = [150 150 150];
10 k_list = [(0.82-0.23) (0.4-0.25) (0.33-0.26)];
11 a_list = [0.93 0.93 0.93];
12
13 % the for loop below simulates the channel at each distance
14 % we run through the distance list backwards so figures appear in correct
15 % order on the edX platform
```

Correct

```
c_list = [0.23 0.25 0.26];
d_list = [150 150 150];
k_list = [0.6 0.15 0.07];
a_list = [0.93 0.93 0.93];
```
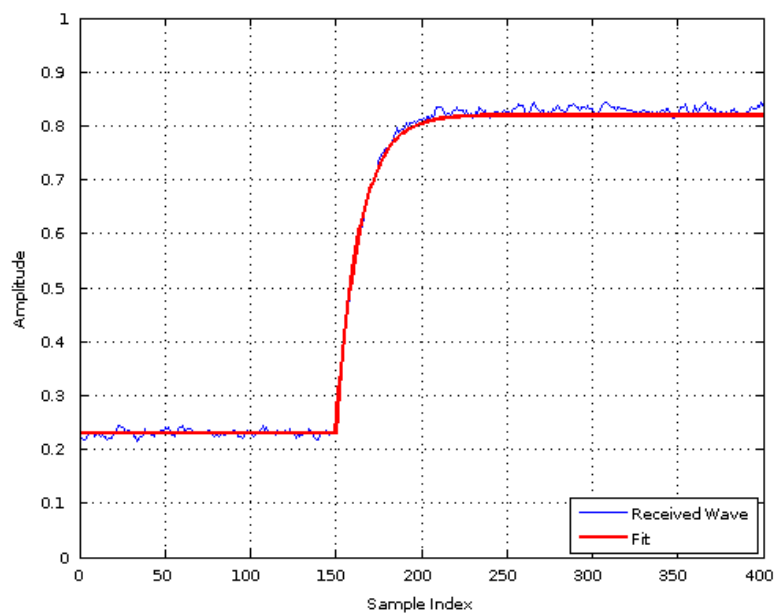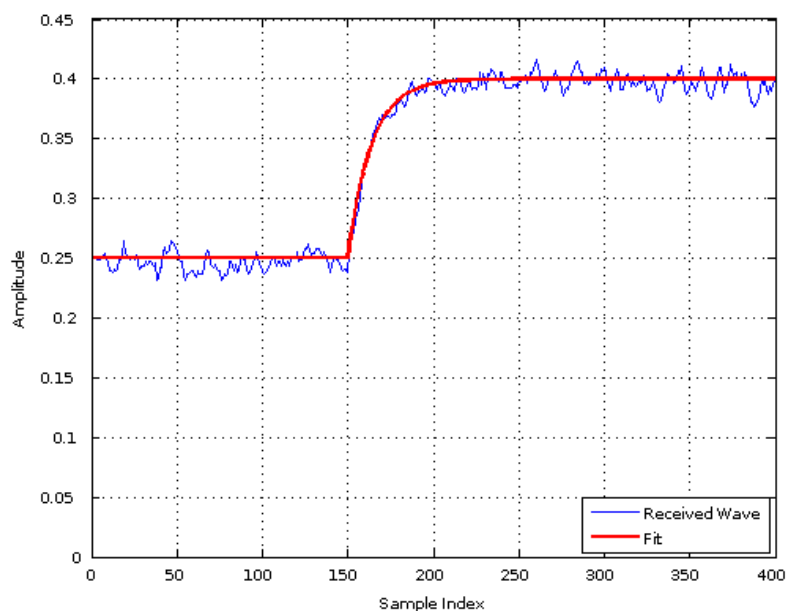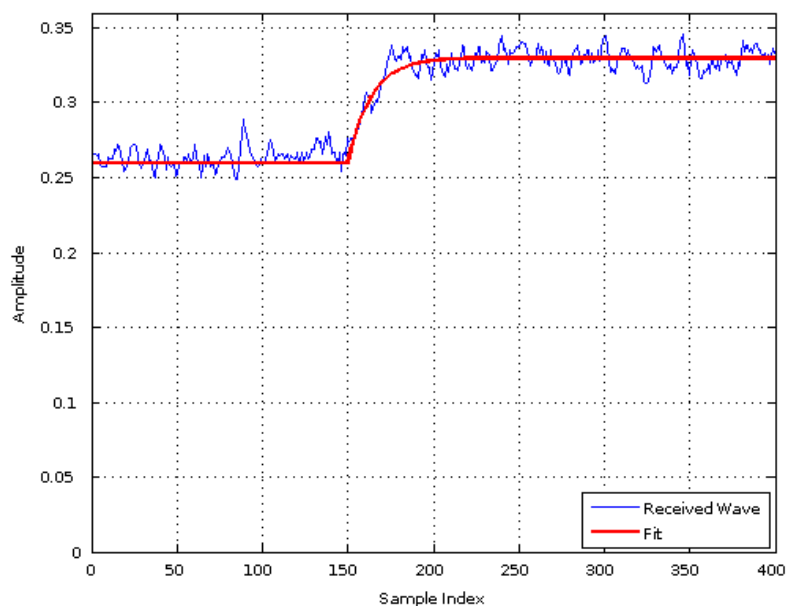
Help

Figure 1

Figure 2

Figure 3

MSE at distance 10 = 5.8937e-05

MSE at distance 20 = 5.1513e-05

MSE at distance 30 = 6.1838e-05

| Check | Reset | Save | Hide Answer | *You have used 1 of 10 submissions* |

INSTRUCTIONS

Step 1: Simulate the channel at the given transmission distances

Run the code as presented. You will see three figures comparing the received and the fitted waveforms at different transmission distances.

Step 2: Adjust the parameters for different distances

You will see that the predicted waveforms cannot fit the received waveforms. You need to adjust the parameters listed in the variables `c_list, d_list, k_list` and `a_list` to fit the received waveforms with **MSE** less than 1×10^{-4}.

How does the change of the transmission distance affect the response of the channel?
Hint: some parameters are distance dependent; but some are not. Can you explain why?

Step 3: Submit your work

You can run your code as many times as you like to understand the effect of the transmission distance on the communications sytem. Once you are ready, click on the **Check** button to submit your work. Make sure the distance list is set to `[10 20 30]` and that **MSEs** of your fits are all less than 1×10^{-4}.

Step 4: Answer the questions

Based on what you observed in your experiments, answer the question below.

LAB 2 TASK 2 - QUESTION 1 (1 point possible)

As the transmission distance increases, the value of the signal range parameter k _____?

Help

○ Increases

○ Decreases

○ Remains constant

| Final Check | Save | *You have used 0 of 1 submissions* |

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