Run the *"mainFunction"* as below:
mainFunction(rh, dist, file_name)
Where, "*rh*" is the relative humidity of the channel, "*dist*" is the transmitter-receiver distance in cm, and "*file_name*" is the path to the .picotd file that is captured in Picometrix lab. Each .picotd file contains 4096 time samples and the corresponding amplitude of the captured signal (pulse).
Here is an example for calling the "*mainFunction*" with a proper set of input:
mainFunction(40, 100,'sample.picotd')
Here, "*rh*" is equal to 40, transmitter-receiver distance is 100 cm, and the .picotd file is given as sample.picotd.

The following is a description of the body of the "*mainFunction*":
"*Ts*" is the sample time of the Picometrix system and is equal to 78.125×10^{-15} s.
"*c*" is the light velocity and is equal to 2.997925×10^{8} m/s.
The "*readPicotd(file_name)*" function reads the .picotd file. Since the file has 5 lines of header, it reads the file from the 6^{th} line and saves the signal's amplitude in "*x*" variable and the corresponding sample time in "*t*" variable.
The "*drawDiagram*" function plots a desired diagram. The x and y arrays and their labels should be given as the input of the function. The last input is the diagram's title.
The time domain plot shows that there are oscillations to the right of the main pulse. These oscillations are due to back-reflections of the antenna substrate of the Picometrix system. To decrease the effect of these oscillations, the "*filterTimeDomain*" function filters the pulse with a 500 index window.
"N" is the fft points in frequency domain and is equal to the number of time samples. Here, the value of "*N*" is 4096.
"*X*" is the calculated fft of the time domain signal.
"*absorption*" function calculates the absorption coefficient for water vapor, nitrogen, carbon dioxide, and oxygen molecules based on VVW (van Vleck-Weisskopt) line shape. The parameters for the calculation are acquired from Hitran database.
"*H*" is the transfer function of the channel for the given "*rh*" and "*dist*" (transmitter-receiver distance).
The following is the formula for calculating the transfer function in a directional channel:

$$H(f) = e^{-(j2\pi f\tau + dK(f))}$$

Here, "τ" is the time in seconds required for the signal to travel through transmitter-receiver distance "*d*", and "*K(f)*" is the absorption coefficient of the channel.