Humid and dry air frequency versus amplitude plots

The frequency domain for each captured signal in time domain is generated via a Fourier transform of the signal.

Figure (1) shows the frequency spectrum of the signal in the humid environment when the receiver is placed 11.5 cm away from the transmitter.

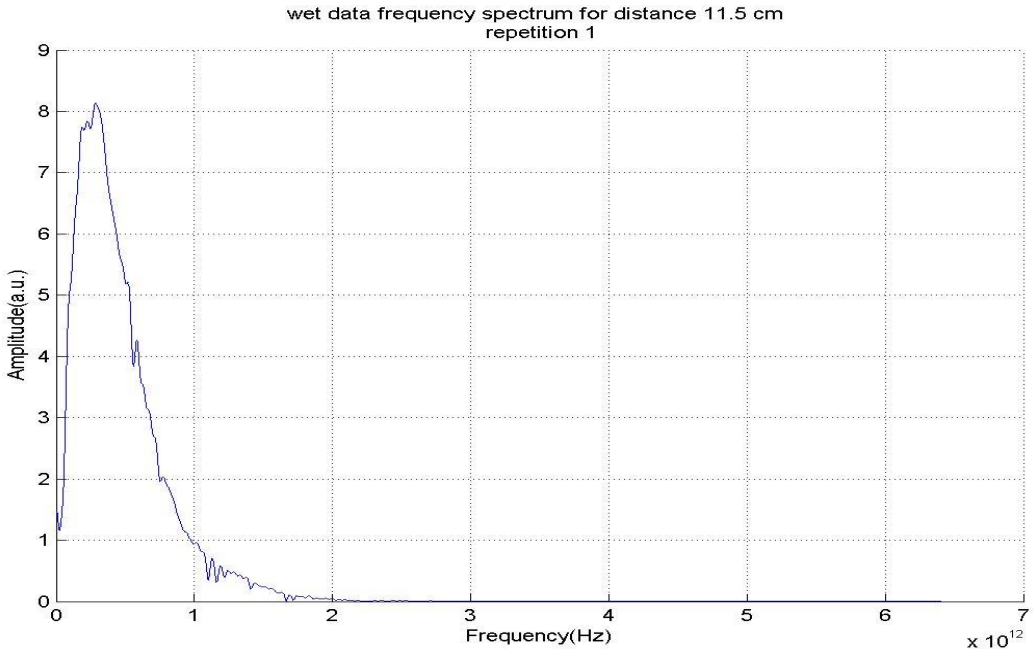

Figure (1)

The x axis is the frequency in Hertz and the y axis shows the amplitude of the signal for each corresponding frequency.

As it is shown in the figure (1) the detected signal energy distributes mainly below 2 THz in our system and over 2 THz the signal is too small to be detected from noise.

The similar experiment is conducted in the dry environment.

Figure (2) shows the frequency spectrum of the signal in the dry environment when receiver is placed 11.5 cm away from the transmitter.

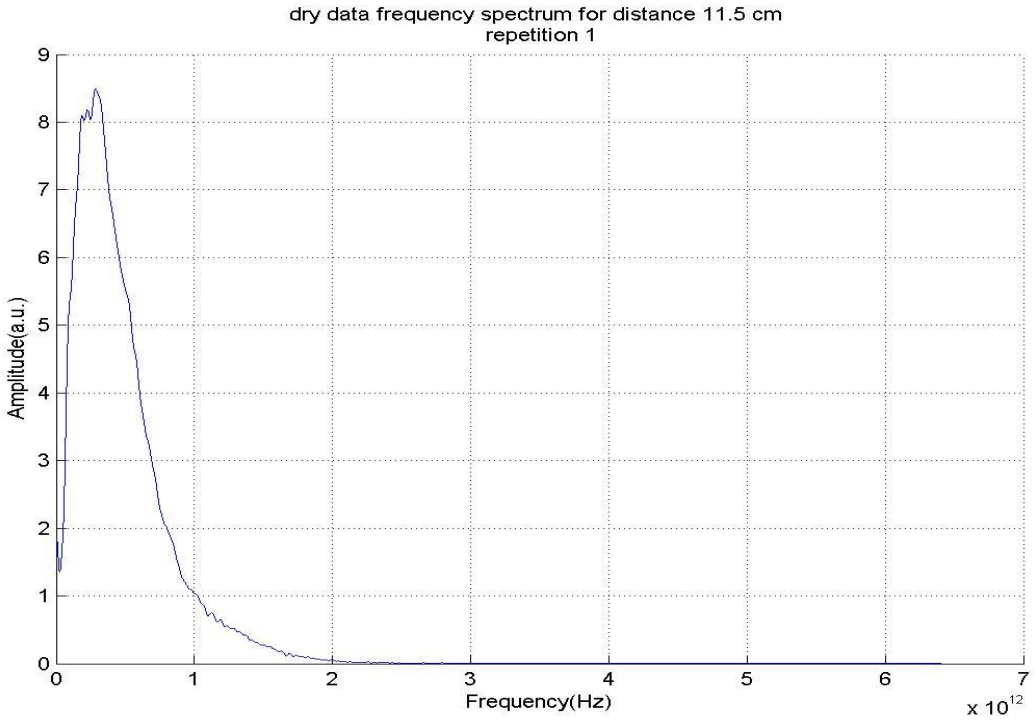

Figure (2)

By comparing the figures carefully, it is obvious that the signal's energy is absorbed in some frequency bands in the humid environment.

This absorption is mostly because of the water molecules vibrations which causes signal's energy absorption in some particular frequency bands.

Figure (3) compares the frequency spectrum of signal under humid and dry conditions for 11.5 cm distance between the transmitter and the receiver.

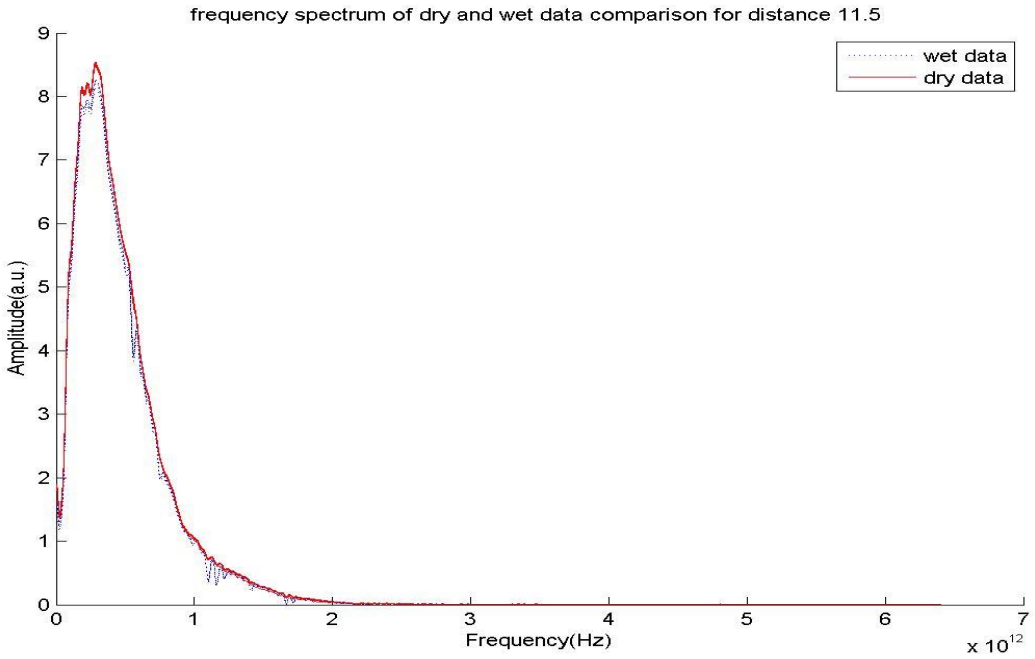
frequency spectrum of dry and wet data comparison for distance 11.5
wet data
dry data
Amplitude(a.u.)
Frequency(Hz)
x 10^12
0
1
2
3
4
5
6
7
8
9

Figure (3)