EM Wave in Drude-material

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Abstract

With a given plasma frequency and collision, various configurations of EM waves in drude-type material are explored.

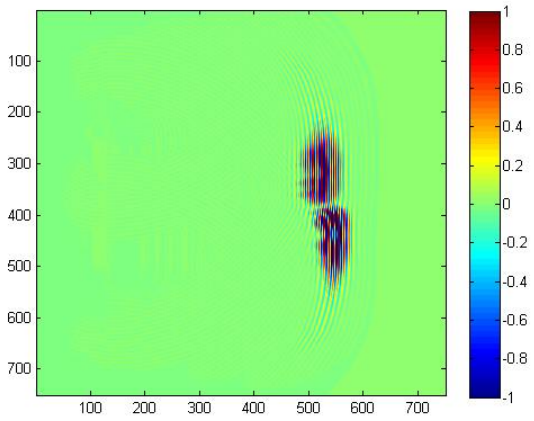
1 Introduction

The convolution is the only extra operation that needs to be performed when compared to the previous reports. We are convolving an exponential function (of drude material) with the fields, and then differentiating this. Instead, first, the exponential is differentiated, and then convilution is performed. The values to be convolved are stored in an array.

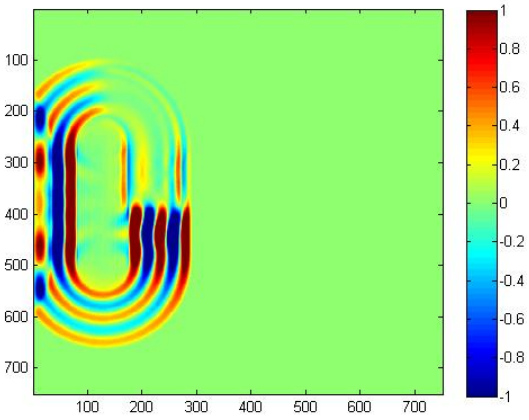
2 Observations

On running the simulation in the case where the top half is filled with the drude material, the following can be observed. Clearly, since we can see the spread in the wave width, it can be seen that different frequencies travel at different speeds in this medium, compared to the air medium below.

The medium on top is the drude material, and the one on the bottom is vacuum.



Below the plasma frequency, the wave does not survive in the medium.


100
200
300
400
500
600
700
100
200
300
400
500
600
700
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1