Analysis of Two Coaxial Microwave Chambers having Possible use for Characterization of Materials

a Finite Element Analysis (FEA)

using

Comsol Multiphysics

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The two kinds of coaxial microwave chambers are analyzed for the purpose of obtaining a better understanding of the nature and structure of the internal fields.

Within the chambers is a region where the conductivity is .001 Siemens/meter. This value of conductivity is that of a semiconductor or weakly conducting electrolyte solution.

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Coaxial Microwave Chamber Type 1

A numerical experiment with a semiconducting material within the microwave energy flow path

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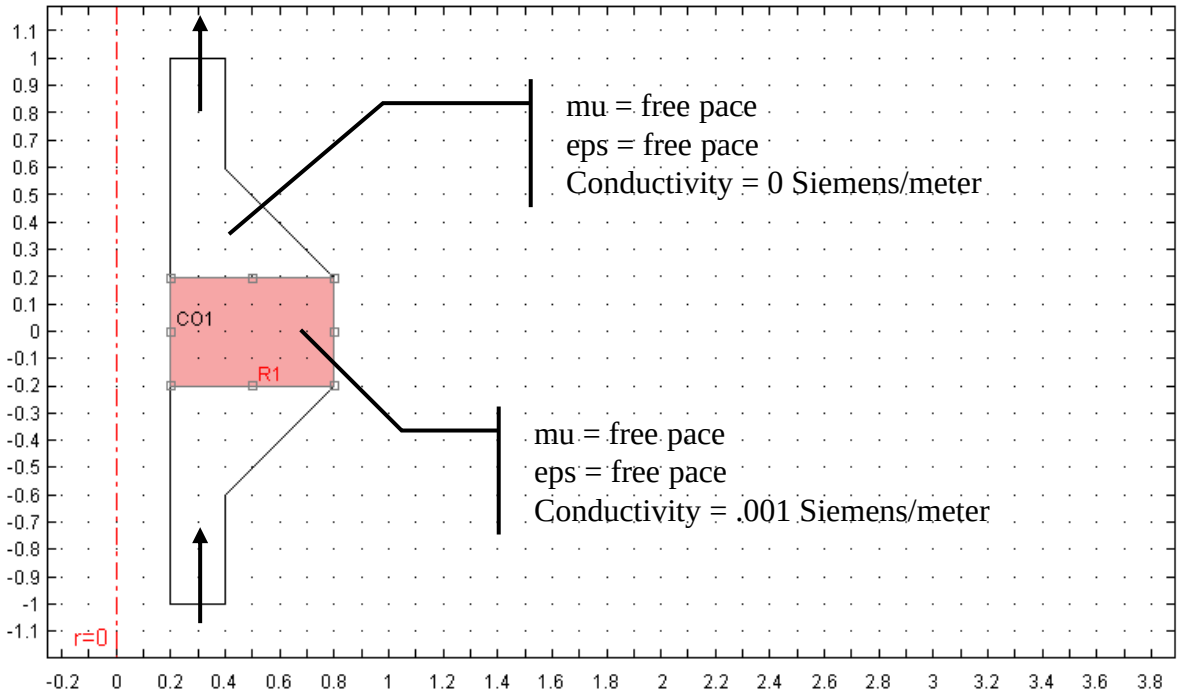
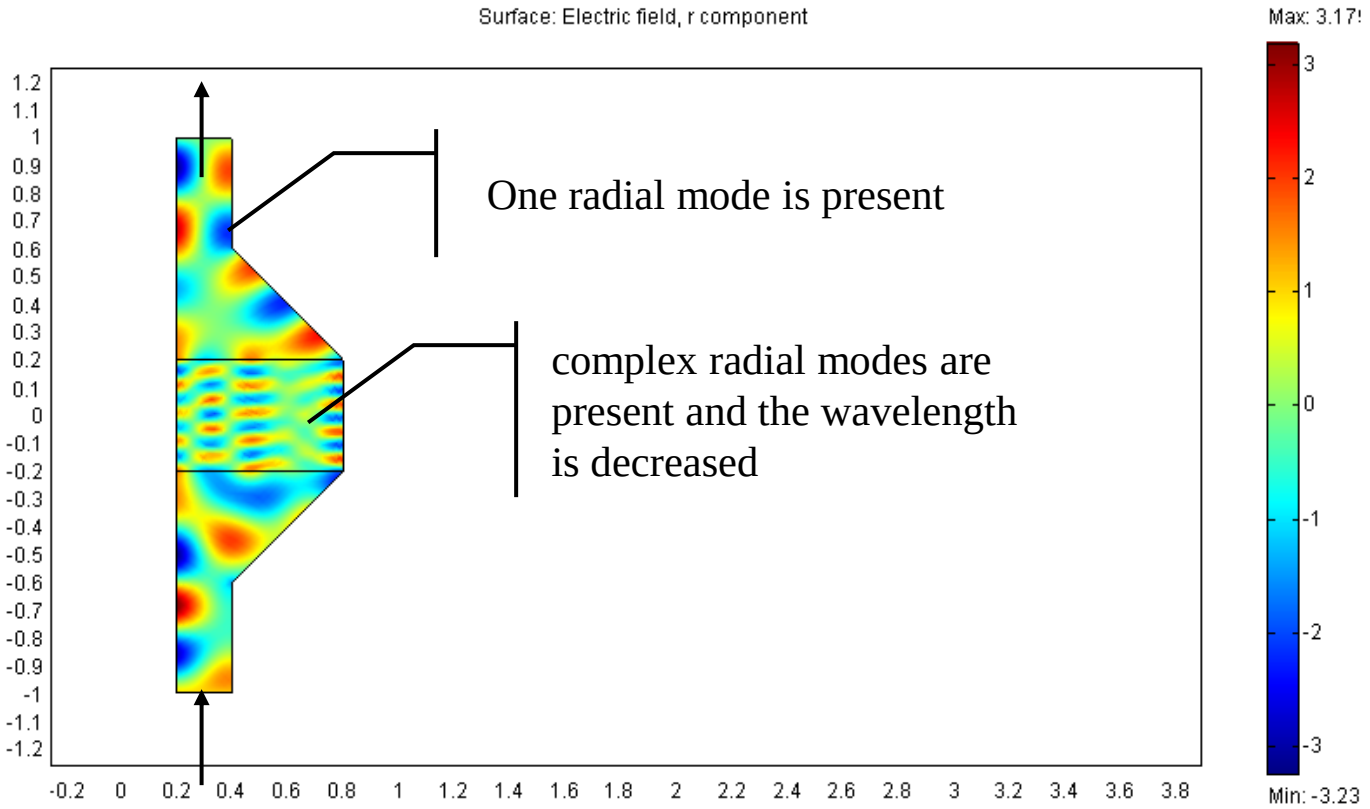


3.2.1. Scalar Variables.

Name	Variable	Value	Description
epsilon0	epsilon0_weh	8.854187817e-12	Permittivity of vacuum
mu0	mu0_weh	4*pi*1e-7	Permeability of vacuum
nu	nu_weh	1e9	Frequency



Radial Component of the E field

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Coaxial Microwave Chamber Type 2

A numerical experiment with a semi-conducting material within the microwave energy flow path

In this model, the inner conductor had been enlarged so as to control the radial modes that are otherwise be present

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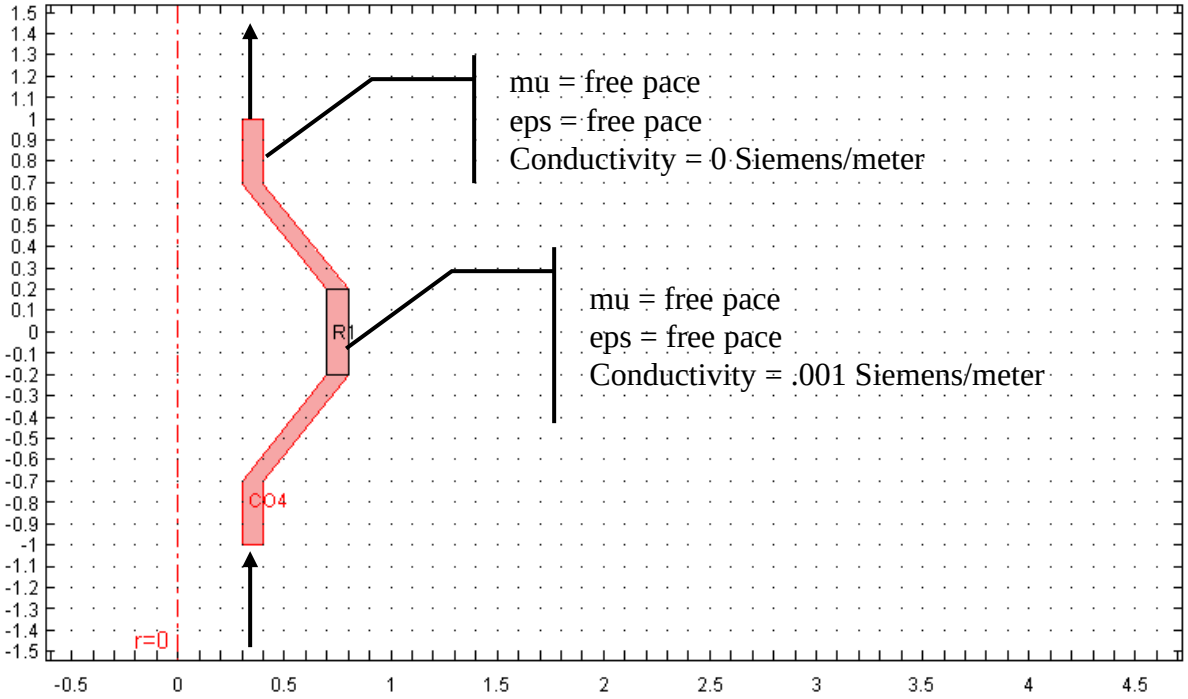

3.2.1. Scalar Variables.

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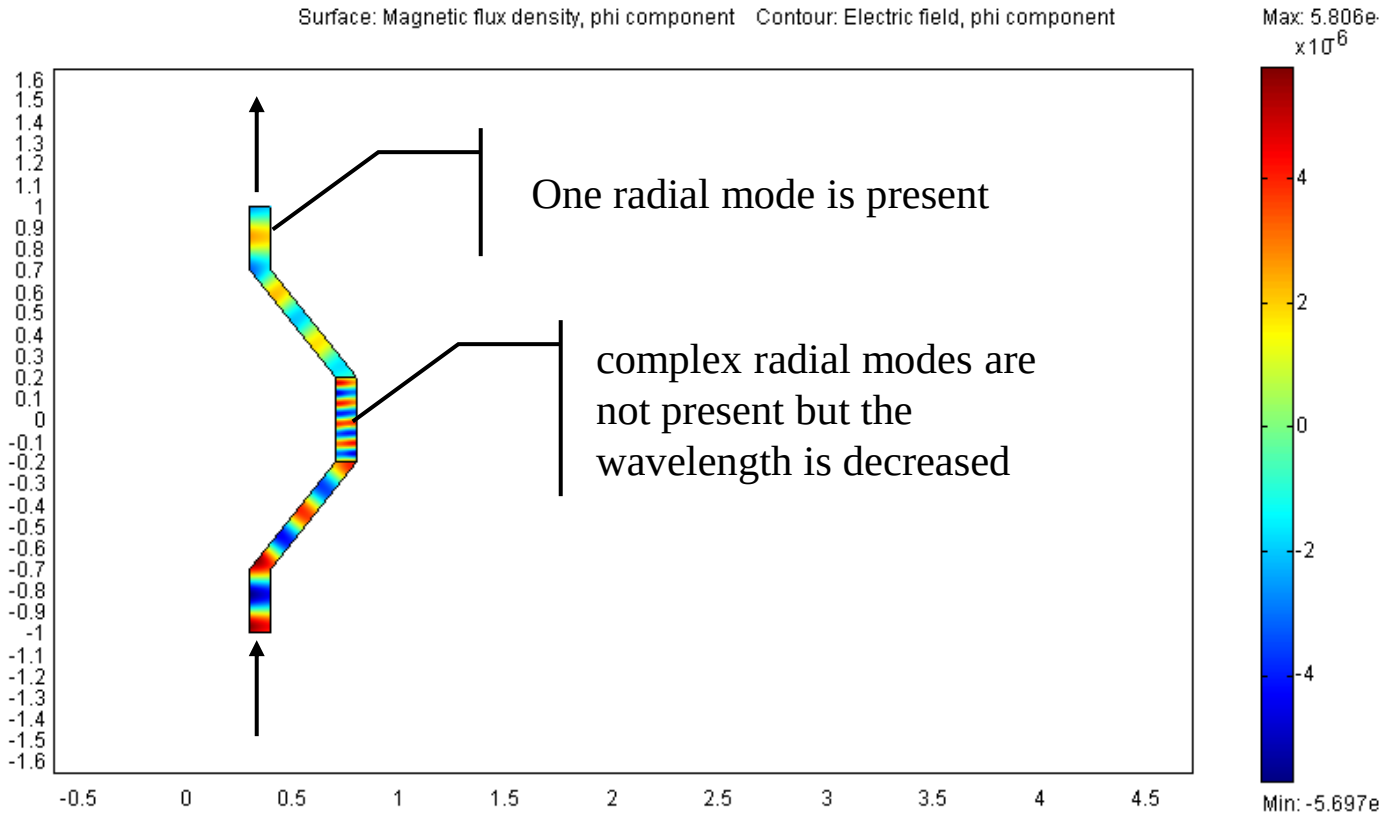

Azimuthal Component of the E field

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Summary and Conclusions

Two types of similar but different coaxial chambers have been analyzed by means of the finite element method (FEA).

The results show the effect of material conductivity on wavelength within the coaxial chambers.

The results show that control of radial modes requires expanding of the dimensions of the inner conductor

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