

Modeling the interaction of terahertz radiation with human skin to differentiate between healthy skin and BCC

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Introduction

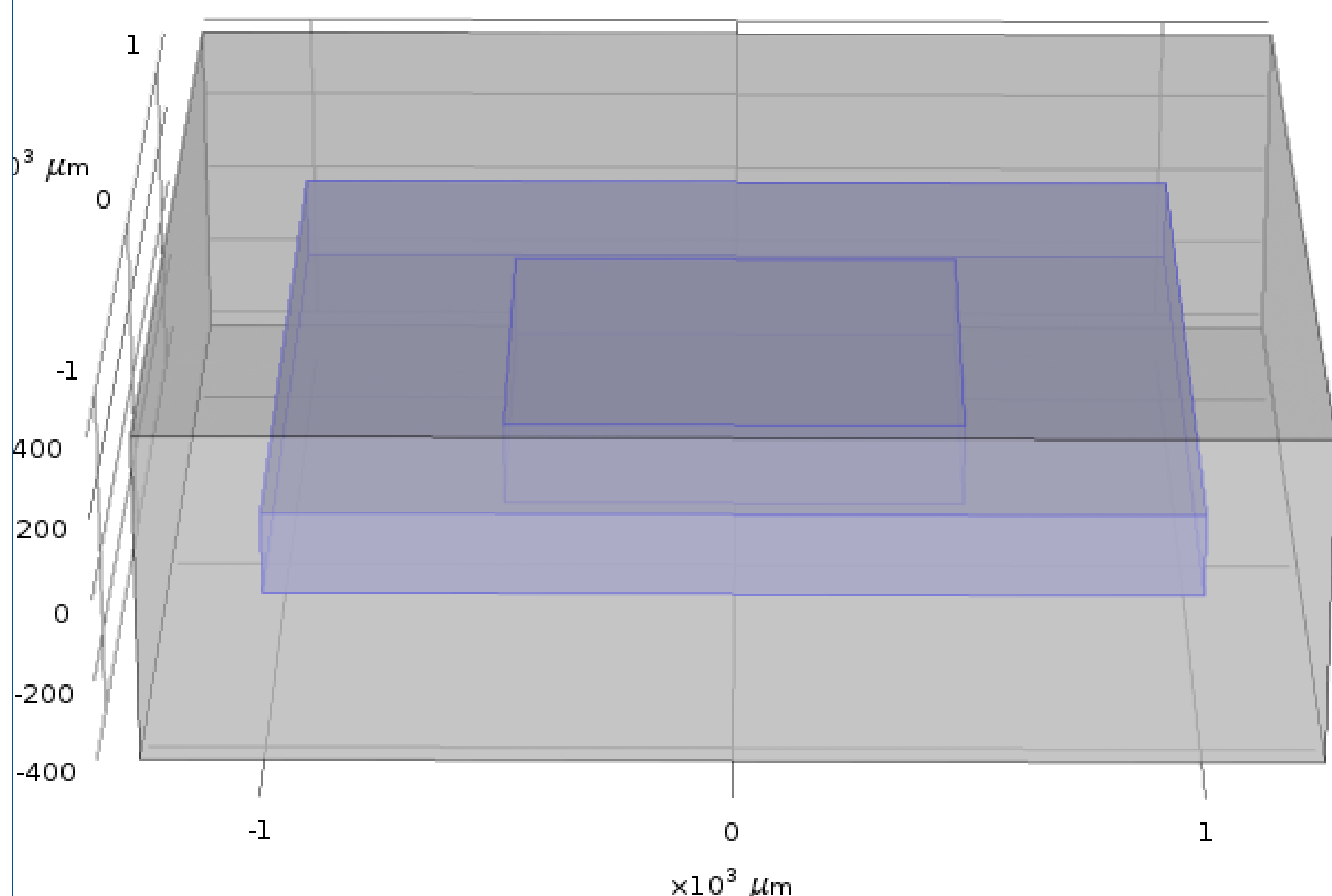
This simulation is proposed to model the interaction between terahertz radiation and human skin, aiming to differentiate between healthy skin and cancerous skin.

Computing Method

We set terahertz waves to illuminate the skin sample, and observe the reflected electric field from the sample to obtain the electric field distribution on the sample surface, from which we can get the contrast image. The physics used in our model is *Electromagnetic Waves, Transient*.

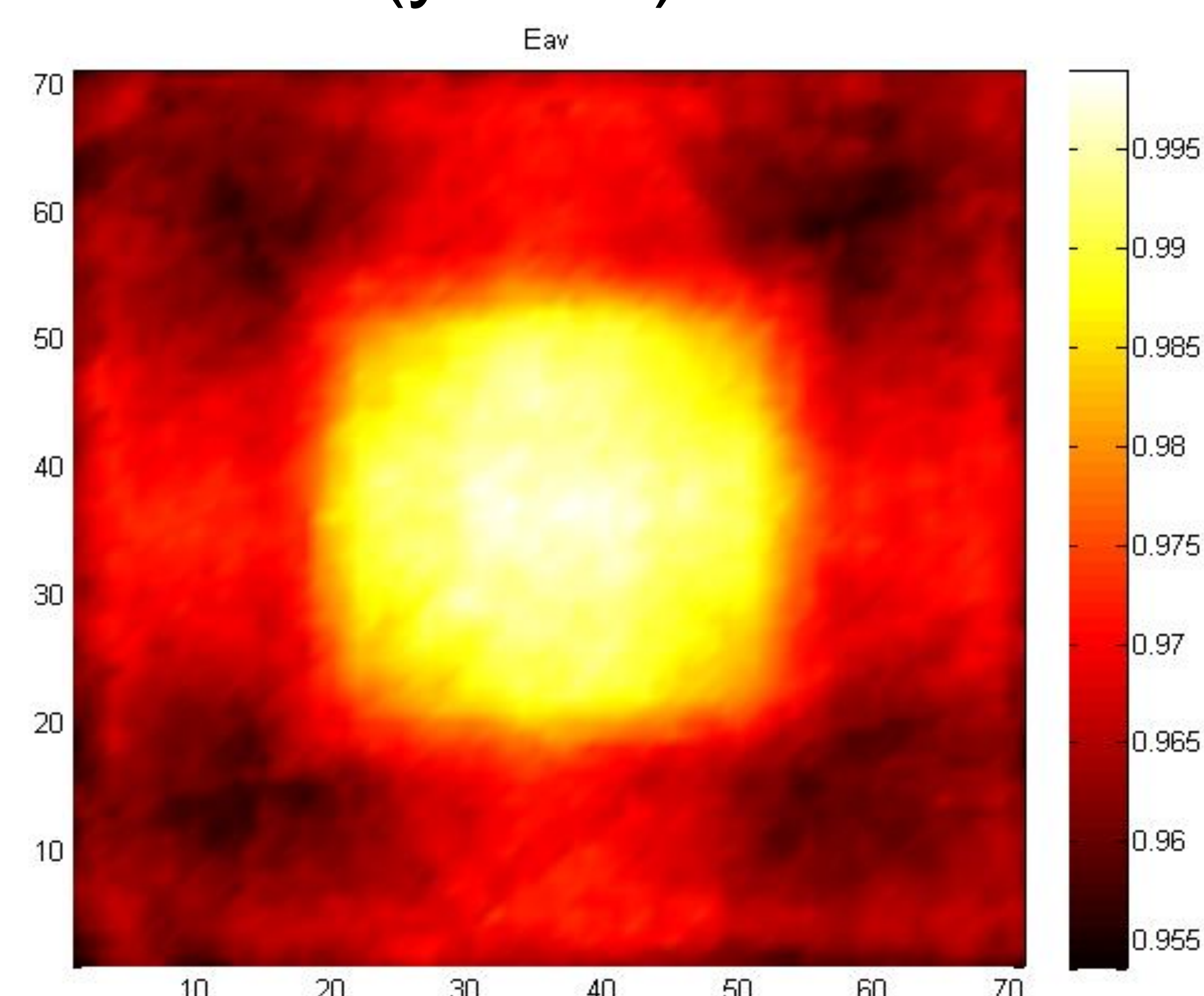
Geometry

Our model is as below. We modeled the cancerous skin surrounded by the healthy skin. The sample is put in an air domain with its boundaries set as *Scattering Boundary Condition*.



Results

We got the reflected electric field from the sample surface. With the reflected field data, we imaged the cancer-containing sample as the following figure. From the figure, we can clearly differentiate between the healthy skin (red and black) and the cancerous skin (yellow).



Conclusions

We demonstrated that the cancerous part in human skin can be detected using the terahertz imaging. Our model could explain the interaction of terahertz radiation with biological tissue in a way. It might provide a considerable reference for future terahertz imaging on biomedical applications.

Reference

1. Ding Y H, Tan E L. Modeling the Interaction of Terahertz Pulse with Healthy Skin and Basal Cell Carcinoma Using the Unconditionally Stable Fundamental Adi-FDTD Method[J]. Progress in Electromagnetics Research B, 2012, 37(37):365-386.