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Simulations of light propagation in dielectric materials with the finite difference time domain (FDTD) method NATHANIEL HAWK, Department of Electrical Engineering, JUTTA LUETTMER-STRATHMANN, Department of Physics, The University of Akron, Akron, Ohio — Electromagnetic simulations allow for the study of light propagation in complex systems. There are many interesting optical geometries utilized today in the area of photovoltaics. By simulating material of various dielectric and conductive properties, we can experiment with geometries to tune optical systems. This is useful not only in the area of photovoltaics but in optical sensor design and many other areas. We have simulated materials using the finite difference time domain (FDTD) method in one, two and three dimensions. We created a simple one-dimensional simulation to validate the functionality of our finite difference calculations. We have simulated three dimensional dielectric sphere configurations as well as two dimensional parabolic mirror configurations at various frequencies. The results of the parabolic mirror simulations show that the intensity of the electric field in steady state forms unique interference patterns for each frequency near the focal point. This suggests that geometric structures may be tuned for specific frequencies and their harmonics by exploiting these interference geometries.

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