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Timothy Meagher* (meagher@pdx.edu) and **Bin Jiang** (bjiang@pdx.edu). *A New Finite Difference Time Domain Method to Solve Maxwell's Equations.*

We have constructed a new Finite Difference Time Domain (FDTD) method in this project. Our new algorithm focuses on the most important and most challenging transverse electric (TE) case. Our new algorithm is built based upon the integral version of the Maxwell's equations as well as the above continuity conditions. The theoretical analysis shows that the new algorithm can reach second-order convergence $\mathcal{O}(\Delta x^2)$ with mesh size Δx . The subsequent numerical results demonstrate this algorithm is very stable and its convergence order can reach very close to second order, considering accumulation of some unexpected numerical approximation and truncation errors. In fact, our algorithm has clearly demonstrated significant improvement over all related FDTD methods using effective permittivities reported in the literature. Therefore, our new algorithm turns out to be the most effective and stable FDTD method to solve Maxwell's equations involving multiple media. (Received February 02, 2018)