Meeting: 1005, Newark, Delaware, SS 3A, Special Session on Mathematical Methods in Electromagnetic Wave Propagation

1005-78-94 **Daniel S. Weile*** (weile@ee.udel.edu), 140 Evans Hall, Newark, DE 19716, **Raymond A. Wildman** (rwildman@udel.edu), 140 Evans Hall, Newark, DE 19716, **Greeshma Pisharody** (pisharod@mail.eecis.udel.edu), 140 Evans Hall, Newark, DE 19716, and **Anuraag Mohan** (mohan@mail.eecis.udel,edu), 140 Evans Hall, Newark, DE 19716. *On the solution of the time-domain integral equations of electromagnetics using bandlimited signal representations.*

While numerical methods for the solution of differential equations and frequency-domain integral equations have been popular tools for decades in electromagnetic modeling, time domain integral equation methods have proved inefficient and unstable. Inefficiency issues have been largely addressed by fast numerical methods, but the instability issue remains. This work will discuss the potential roots of this endemic instability, and novel numerical solution techniques that appear to avoid it. In particular, new basis functions of limited bandwidth are used to model the current, so that energy is prevented from aliasing from high frequencies to low frequencies. Unfortunately, bandlimited interpolatory basis functions must be noncausal, so a bandlimited extrapolation technique is used to recover causality. Finally, nonuniqueness issues associated with static charges and currents are described, as are new techniques to mitigate their effects. Numerical results for both the Galerkin and Nyström methods demonstrate the efficacy of the techniques used in producing stable and accurate results for scattering from conducting and dielectric bodies. (Received February 01, 2005)