

# COLLOQUIUM

## Time Domain Integral Equations for Computational Wave Propagation

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Scattering problems for the wave equation or Maxwell's equations can be solved in the frequency or time domain. In the frequency domain both finite element and boundary integral methods are in common use, and their relative strengths and weaknesses are well understood. In the time domain the principle technique is the finite difference time domain method, and time domain integral equations are much less widely used. However, time domain integral equations have become much more popular in recent years, although they still represent a considerable coding challenge. This can be mitigated by using the convolution quadrature approach (CQ)<sup>1</sup>.

I shall outline the CQ method applied to the wave equation using the problem of computing waves scattered by a penetrable object as a model problem. After discussing some properties of the scheme, I shall present numerical results computed using the a Fourier basis. I shall also comment on applications in electromagnetism.

The lecture will take place in Thackeray 704 at 3:30pm.  
Refreshments will start at 3:00pm.

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<sup>1</sup>C. Lubich, On the multistep time discretization of linear initial-boundary value problems and their boundary integral equations, *Numer. Math.*, 67 (1994), pp. 365389.