Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Numerical methods for the 1D quasistatic wave equation J. PAXON REYES, B.A. SHADWICK, University of Nebraska - Lincoln — We studied the numerical and analytical dispersion relations of the full and reduced 1D quasistatic wave equation in moving window coordinates. The goal is to identify appropriate numerical methods in terms of numerical dispersion relations calculated from discrete transforms of the representative difference equations. Comparing the numerical and actual dispersion relations illustrates a source of phase error, and the accuracy of the group velocities is important for correct wave propagation. Each method yields a particular dispersion relation, and we have made a survey of stability conditions for all the reasonable numerical methods used to solve the wave equation. The dispersion relation of the reduced wave model is disparate from that of the full wave model, but for any one wave number we can adjust the coordinate velocity to reconcile the dispersion relations for the forward-propagating modes. We compare our findings in the case of a linear plasma and the vacuum.

Bradley Shadwick
University of Nebraska - Lincoln

Date submitted: 26 Jul 2010 Electronic form version 1.4