Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Numerical simulations for parabolic pulse shaping in non-linear media[1] R.C. NORA, C.G. DURFEE, L.D. CARR, Physics Department, Colorado School of Mines — Pulses with parabolic temporal profiles have the property that they can propagate through non-linear media in a self similar manner. Parabolic pulses have been generated experimentally in fiber amplifiers. Input pulses develop into parabolic pulses by the combined action of group velocity dispersion, non-linear refractive index, and gain. In this work, we are exploring the feasibility of generating ultrafast parabolic pulses in laser resonators. We have successfully numerically simulated the generation of parabolic pulses in fiber amplifiers using two different algorithms, the Cayley method, and fourth order Runge-Kutta, to solve the Nonlinear Schrodinger equation with gain and periodic boundary conditions. In contrast to fiber amplifiers, pulses in laser resonators must maintain a stable pulse shape on each round trip through the optical cavity. We are exploring the prediction that a time dependent saturable gain will stabilize the pulse in the oscillator and yield parabolic pulses.

[1]This work was supported by the National Science Foundation

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Date submitted: 20 Dec 2006 Electronic form version 1.4