1023-78-826 **Kathryn E Rasmussen*** (rasmuk3@rpi.edu), Mathematical Sciences Department, Rensselaer Polytechnic Institute, 108 10th Street, Troy, NY 12180. *Numerical simulations of resonant optics in meta-materials with negative refractive index.* Preliminary report.

In a resonant interaction, light of specific wavelengths excites electron transitions between atomic energy levels in an active optical medium. In the lambda-configuration, a pair of transitions between an energetically higher and two lower atomic levels involves light of two different colors. Optical meta-materials with negative refractive index exhibit unusual properties, such as complete reflection at the material-air boundary, and perfect lens-like focusing. They are produced by periodically embedding pairs of nano-wires in transparent materials. Resonant currents induced in these pairs cause the medium to have negative magnetic permeability in addition to negative electric permittivity, and thus a negative refractive index. To compensate for the high losses in such media, one embeds nano-wire pairs into a lambda-configuration material. The frequency of one color will induce resonant currents in the nano-wire pairs. For this color, the medium will have negative refractive index. The frequency of the other color will be far off-resonance so this color will serve as an energy source. We present simulations of pulses traveling through a hybrid positive-negative refractive index meta-material. Light pulses, their formation, stability properties, and breakup will be discussed. (Received September 22, 2006)