Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Beating diffraction limit in an absorptive superlens MENG XIAO, CHE TING CHAN, the Hong Kong university of Science and Technology — It is well known that a slab with both permittivity and permeability equals -1+iδ can achieve super resolution and its mechanism can be understood with the idea of complementary material. In practice, meta-materials are always absorptive and the absorption sets an upper limit for the image resolution. Here, we study the image formation of stratified complementary slabs in the time domain. Instead of only one slab of super lens, we consider a stack of AB structured complementary slabs, where A is a super lens and B is normal material. We show that the superlens stack can beat the diffraction limit even in the presence of loss if the source has a time-dependent intensity profile. We derived a general analytical expression for the group velocity of an arbitrary k component including evanescent waves near frequency where "complementary" is satisfied and the analytical results can explain the super solution in the presence of loss. And our results shows that, with a Gaussian shaped pulse illumination, the image resolution can be improved by about 45% relative to harmonic illumination for the same system.

Meng Xiao
the Hong Kong university of Science and Technology

Date submitted: 02 Nov 2012 Electronic form version 1.4