Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Cloaking Effect of Superlens in Time Domain MENG XIAO, The Hong Kong University of Science and Technology, JIAN WEN DONG, Sun Yat-Sen (Zhongshan) University, XUEQIN HUANG, CHE TING CHAN, The Hong Kong University of Science and Technology — A "perfect lens" (ideal absorption-less slab with μ=?=-1) or "superlens" (a perfect lens with small absorption) can cloak a small object located in its vicinity such that no far field observer can detect the small particle, i.e., being invisible. While the problem is well understood in the steady state by solving the Maxwell equation in frequency domain, its time domain properties, such as how the cloaking effect started, remained unknown. In this paper, by using the time-dependent Green's function approach, we present a time domain study of the cloaking properties of the "superlens" As a current source is turned "on," the system's response will be consisted of a transient response in the beginning and a steady state response in the long run. It turns out that it takes a long time (tens of thousands of cycle) for the "perfect lens" to build up the cloaking effect, and this required period depends on a number of factors, such as the separation between the lens and the particle, the absorption of the slab, and the dispersion of the slab. Moreover, along with many other interesting effects, we also find that, the dipole moment, on its way to be invisible, it oscillates with a decreasing amplitude.

Meng Xiao
The Hong Kong University of Science and Technology

Date submitted: 18 Nov 2011 Electronic form version 1.4