Abstract: In the June 23, 2006’s issue of *Science* magazine, Pendry et al and Leonhardt independently published their works on electromagnetic cloaking. In Nov. 10, 2006’s *Science* magazine, Pendry et al demonstrated the first practical realization of such a cloak with the use of artificially structured metamaterials. Since then, there is a growing interest in using metamaterials to construct invisibility cloaks. In this talk, I’ll first give a brief introduction to wave propagation in metamaterials, then I’ll focus on the mathematical analysis of some cloak models. Numerical simulations using finite element methods in time domain will be presented.