

Recent advances on mathematical analysis and simulation of invisibility cloaks with metamaterials

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In the June 23, 2006's issue of Science magazine, Pendry et al and Leonhardt independently published their papers 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 constructed metamaterials. Since then, there is a growing interest in using metamaterials to design invisibility cloaks. In this talk, I will first give a brief introduction to invisibility cloaks with metamaterials, then I will focus on some time-domain cloaking models. Well-posedness study and time-domain finite element method for these models will be presented. Finally, I will show some numerical simulations of time-domain cloaking and optical black holes. I will conclude the talk with some open issues.