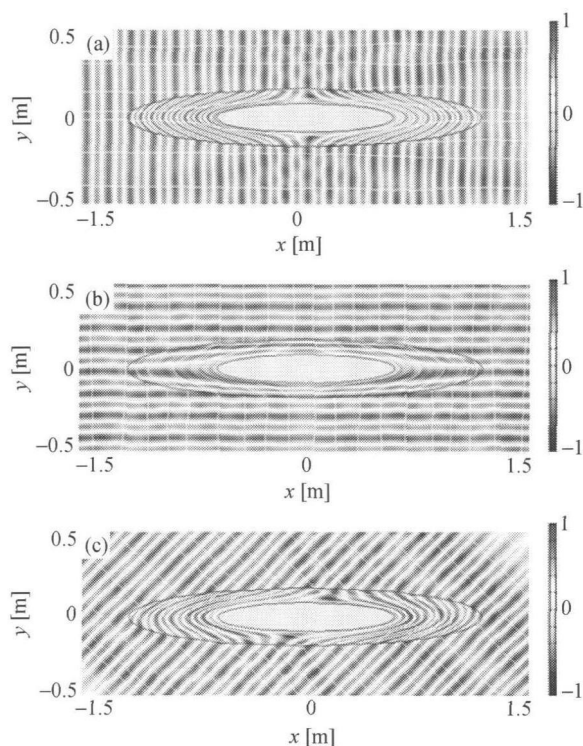


# Progress of the Research on Arbitrarily Elliptical Invisibility Cloaks



The research group led by Professor Tie Jun Cui, the State Key Laboratory of Millimeter Waves, Southeast University, has made an important progress in invisibility cloaks. “*EuroPhysics News*” reported their result as a Research Highlight in the June issue (*EuroPhysics News*, Vol. 39, No. 3, p. 24). The group designed elliptical-cylindrical invisibility cloaks with arbitrarily axis ratio using the theory of optical transformation. The corresponding paper was published on March 20, 2008 in *Journal of Physics D: Applied Physics*.

Due to the exciting property of invisibility, electromagnetic cloaks have attracted more and more attention. In earlier times, many theoretical and numerical works had been devoted to the circularly-cylindrical cloak, which is very restricted in practical applications. Prof. Cui and his group designed elliptical-cylindrical invisibility cloaks with arbitrarily axis ratio by using the techniques of optical transformation, which is based on the form-invariance of Maxwell’s equations. They presented the expression of electromagnetic parameters for such invisibility materials and provided validation by finite-element simulations. The simulation results showed that the designed elliptical cylindrical cloaks have very good performance of invisibility. They also showed that the material parameters in elliptical cloaking are singular at only two points, instead of on the whole inner boundary for circular cloaking. Such invisibility cloaks can be realized by artificial meta-materials.

This work was supported by the National Natural Science Foundation of China and the National Basic Research Program of China.