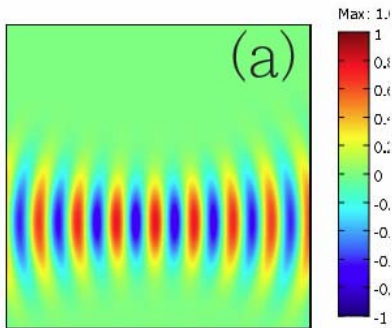


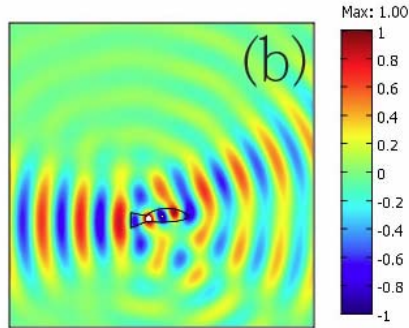
Transformation Optics: Invisibility and Illusion

Using transformation optics, we can design metamaterials that make an object (i) invisible, (ii) appear like another object without touching the object. The former is called "remote cloaking" and the latter is "illusion optics."

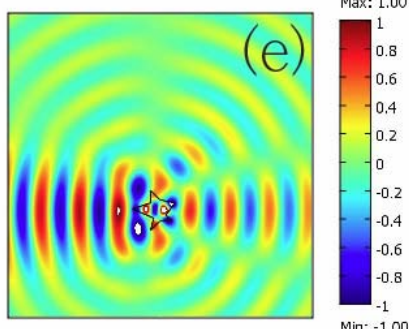
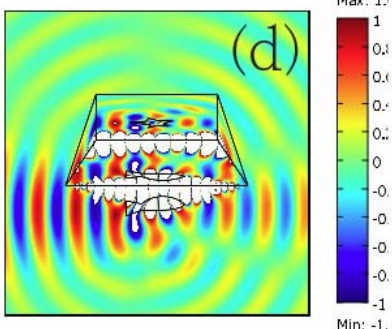
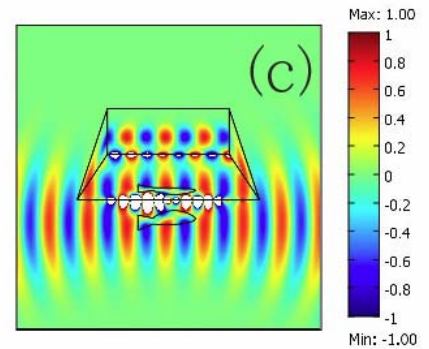
A beam propagating in free space



A beam being scattered by a fish



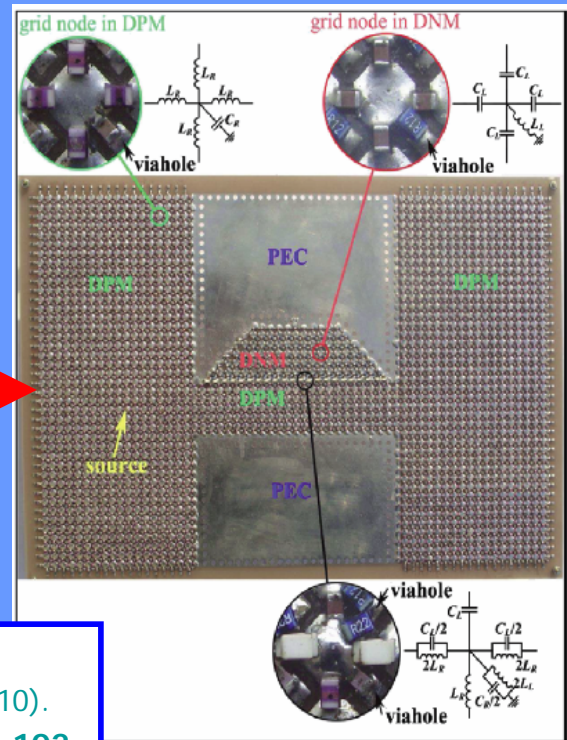
The illusion device (the trapezoid) has cancelled the scattering of the fish. The beam propagates as in free space (like (a)), and the fish becomes "invisible".



Inserting a star into the illusion device, the light is scattered again, now like a star.

The scattering pattern on (d) is exactly the same as the scattering pattern of a star here.

By using a transmission-line medium, we experimentally demonstrate for the first time a metamaterial "illusion optics" device--an "invisibility gateway". The device contains an open channel that can block waves at a particular frequency range.



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