

References

Vanishing Actor

Weiss, Peter. Science News 170. 17 (Oct 21, 2006): 261.

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Abstract (summary):

The first functional invisibility cloak has emerged from a North Carolina laboratory. The new cloak's developers assembled the cloak from 10 narrow bands of fiberglass on which they had imprinted thousands of copper loops. The bands belong to a new class of building blocks, called metamaterials, that go into devices that manipulate electromagnetic waves in ways that were never before possible.

Full Text:

Headnote

Physicists unveil first invisibility cloak

It might not seem like much compared with Harry Potter's magic garment, but the first functional invisibility cloak has emerged from a North Carolina laboratory.

The disk of concentric fiberglass-and-copper hands-about the size of a cocktail coaster-bends a narrow-frequency range of microwaves around a protected zone at its center. By then reorienting those electromagnetic rays so that they exit the disk on their original paths, as if undisturbed, the shield renders itself and whatever is in its protected zone almost invisible to a microwave detector downstream.

A team with members from Duke University in Durham, N.C., the Imperial College London, and the San Diego-based company SensorMetrix created the new device. Several of the scientists last spring proposed h to make such invisibility shields (SN: 7/15/Ob', p. 42).

In the latest experiments, the researchers placed a copper hoop in the path of microwaves and took readings with and without the novel cloak around the hoop. The measurements showed that the cloak eliminated nearly all the microwave disturbances that a naked hoop would cause.

The structure is "doing two things, not perfectly, [that] are the essence of cloaking" says Duke physicist David Schurig, who designed the device. "One is to reduce reflection, and the other is to reduce shadow." He and his colleagues describe the work in a report released Oct. 19 online by Science.

Physicist Oskar .1. Painter of the California Institute of Technology in Pasadena calls the shield "a clear breakthrough that will have a ripple effect throughout the research-and-development community."

It's "a very big splash in the field," agrees mechanical engineer Xiang Zhang of the University of California, Berkeley. "Cloaking has been a dream for many years for many physicists and technologists."

Still, there was a noticeable shadow, notes theoretical physicist Costas M. Soukoulis of Iowa State University in Ames. "I was expecting the device to perform better," he says.

The new cloaks developers assembled the cloak from K) narrow hands of fiberglass on which they had imprint'd thousands of copper loops. The researchers arrayed the hands in concentric circles. The hands belong to a new class of building blocks, called metamaterials, that go into devices that manipulate electromagnetic waves in ways that were never before possible (SN: 3/25/00. p. 198).

To reduce the challenge of making and testing its prototype, the team gave the device a low profile, virtually eliminating the third dimension. They then exposed it to a thin layer of microwaves.

The flat shield has shown that cloaking is possible, but the device is probably not of much practical value. Schurig notes. Threedimensional cloaks promise to be much more useful-for instance, to potentially thwart military radar.

The first demonstration of ,3-D cloaking in microwaves is still at least a year or two away, estimates Duke physicist and team leader David R. Smith.

To be practical against radar, cloaks will have to work across a broad range of microwave frequencies, comments theoretical physicist Nathan Myhrvold, the former chief scientist of Microsoft. Now heading Intellect Ventures in Hellenic, Wash., he does research on metamaterials and has collaborated with the cloak's inventors.

Cloaking at visible-light frequencies isn't yet feasible, Smith notes. -P WEISS

Sidebar

NOW YOU see IT Microwaves bent by the concentric walls of this 1-centimeter-tall invisibility device circumvent the center area and emerge on their original paths as if nothing had been in the way. The copper hoop that was cloaked in the tests isn't pictured.

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