

Scientists one more step closer to realising invisible technology

A unique computer model designed by a mathematician at the University of Liverpool has shown that it is possible to make objects, such as aeroplanes and submarines, appear invisible at close range.

Scientists have already created an ‘invisibility cloak’ made out of ‘metamaterial’ which can bend electromagnetic radiation – such as visible light, radar or microwaves – around a spherical space, making an object within this region appear invisible.

Until now, scientists could only make objects appear invisible from far away. Liverpool mathematician Dr Sébastien Guenneau, together with Dr Frédéric Zolla and Professor André Nicolet from the University of Marseille, have proven - using a specially designed computer model called GETDP - that objects can also be made to appear invisible from close range when light travels in waves rather than beams.

Scientists predict that metamaterials could be of use in military technology, such as in the construction of fighter jets and submarines, but it will be some years before invisibility cloaks can be developed for human beings.

Dr Guenneau, at the University’s Department of Mathematical Science, explains:

“The shape and structure of aeroplanes make them ideal objects for cloaking, as they have a fixed structure and movement pattern. Human beings and animals are more difficult as their movement is very flexible, so the cloak - as it is designed at the moment - would easily be seen when the person or animal made any sudden movement.

“A cloak, such as the one worn by the Harry Potter character for example, is not yet possible but it is a good example of what we are trying to move towards. Using this new computer model we can prove that light can bend around an object under a cloak and is not diffracted by the object. This happens because the metamaterial that makes up the cloak stretches the metrics of space, in a similar way to what heavy planets and stars do for the metrics of space-time in Einstein’s general relativity theory.

“In order for the cloaking device to work in the first place light has to separate into two or more waves resulting in a new wave pattern. Within this pattern we get light and dark regions which are needed in order for an object to appear invisible.

“Until now, however, it was not clear whether photons – particles that make up all forms of light – can split and form new waves when the light source is close to the object. If we use ray optic techniques – where light travels in beams - photons break down at close range and the object does not appear invisible. If we study light as it travels in waves however, invisibility is maintained.”

Scientists predict that invisibility will be possible for objects of any shape and size within the next decade.

The research findings are published in *Optic Letters*.

Source: University of Liverpool

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