New radiofrequency device

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Physical Review Letters, has recently published an article about a radiofrequency device that was designed by a team of researchers at the Public University of Navarra, together with teams from the University of Seville and the Barcelona Universidad Autónoma.

The article is entitled, “Babinet Principle Applied to the Design of Metasurfaces and Metamaterials”.

The article is a result of research work between teams from the three universities on the theme of applications of what are known as meta-materials that have negative refractive index. Specifically, the device designed may be used in mobile communications systems, WiFi, aerials, transmitters, and so on.

A phenomenon of great scientific interest

In the published article, researchers have experimentally validated a phenomenon that has been of great scientific interest of late – that known as left-handed propagating or transmission media. These are media that have curious electromagnetic properties and that are not found in nature as such, i.e. media propagated in waves that do not appear in Nature.

Research was started on this in the 1960s – but as mere speculative theory – and it was not possible to make any kind of medium with the technology existing at the time. Research was taken up again in the late 1990s, when a series of technological solutions was put forward that

enabled the design of a medium that could be manufactured and, in the early 2000s, a medium was developed.

The work of the Navarre researchers is on these lines, specifically applying them to the field of flat microwave circuits. The published article shows the application of these types of structures in flat technology, proposing, moreover, a new structure – that of complementary rings that interchange roles between metallic structures and air. The advantage of this is that it enables the making of a series of circuits that otherwise would be impossible and which, moreover, give quite an optimum response in that they have few losses and these are of small magnitude.

These structures can be applied to any high-range radio frequency device, i.e. mobile communications systems, WiFi, aerials, transmitters, and so on. Moreover, with the design of the flat circuit, the researchers have come up with another development in bidimensional structure which can be employed for shielding radio waves in a building or a room in such a way that interferences in wireless communications are avoided. This involves a series of laminas known as meta-surfaces.

Currently, researchers are continuing their investigations perfecting these surfaces. Moreover, given the optimum result achieved, they hope to make further advances in their applications.

Source: University of Navarre (by Iñaki Casado Redin)