RECENT TRENDS IN ENGINEERING

MATERIAL KNOWLEDGE SHAPES ADVANCED ANTENNAS

By combining a geometric approach using polymer-based dielectric materials, one company is literally changing the face of high-frequency antenna design.

Antennas will be needed everywhere if a fifth-generation (5G) future unfolds with “wireless everywhere.” To help meet the present and future demands for compact antennas at RF/microwave frequencies, the aptly named Antenna Company is poised and ready with an innovative approach to antenna design, drawing on extensive knowledge of materials to achieve the best antenna performance in the smallest footprints possible.

Compact printed-circuit-board (PCB) antennas are traditionally based on resonant transmission-line circuits, such as microstrip, which are straightforward to fabricate and test. Microstrip patch antennas based on circuit materials with low dielectric constant, for example, are capable of developing the fringing fields needed for good directivity using relatively small circuit structures.

Consistent and repeatable antenna directivity is a function of the consistency of the dielectric constant across the antenna substrate material, as well as the mechanical tolerances of the microstrip transmission lines in the resonant circuitry. Recent work with advanced composite materials, often referred to as metamaterials, has shown the potential performance enhancements possible when using selectively engineered circuit materials.

1. The ring shape of this Wi-Fi directional AP/router antenna was made possible through the use of SuperShape technology.

In this vein, engineers at Antenna Company sought ways to develop high-performance, form-fitting antennas that can be designed into modern wireless communications equipment (rather than simply adding them to a system). Their research culminated in the creation of dielectrically loaded polymers and an efficient computational approach to the design of two-dimensional (2D) and three-dimensional (3D) shapes to be used as form-fitting single-band and multiple-band wireless antennas. This new class of materials makes it possible to produce smaller and lighter antennas with high performance levels, essentially reinventing traditional dielectric resonator antennas (DRAs).

The Superformula…

Work by one of the company’s founders, Johan Gielis, and his Gielis Superformula allows the calculation of complex radiating circuit shapes using a simplified set of computational parameters. Gielis serves as vice president of research/materials for the firm, founded in 2013. He is joined on the management team by Chief Executive Officer
David Favreau, a wireless industry executive who led Qualcomm's wireless connectivity business for the past 10 years; Dr. Diego Caratelli, chief technology officer; and Dr. Thomas Wilhelm, VP of manufacturing, who has more than 20 years of polymer manufacturing experience.

By combining the Gielis Superformula with the company’s polymer expertise, the end result is what the company calls a “geometry-based antenna technology.” The technology ultimately delivers smaller antenna form factors with extended frequency coverage and improvements in gain, efficiency, directivity, and polarization. Through detailed system-level computer simulations, the company works with customers to determine optimal antenna placement and orientation for the best possible radiation patterns for a given application, whether in a fixed or mobile system.

…Leads to the SuperShape

The company’s SuperShape DRA antennas (SDRAs) replace the ceramic materials of traditional DRAs with a proprietary polymer material that can be shaped according to the Gielis Superformula to achieve excellent electrical performance within defined mechanical limits. Use of polymer technology allows for simple and cost-effective integration of SDRAs solutions into embedded applications, where size and cost are important considerations. Measurements have shown that SDRAs antenna systems are capable of stable radiation patterns over wide frequency ranges. In addition, they achieve high isolation, enabling systems with closely spaced multiple antenna structures without interference.

The SuperShape Antennas represent examples of the new antenna design approach, constructed as form-fitting shapes for indoor and outdoor wireless communications applications like Wi-Fi routers and public access points (APs). Wi-Fi networks, whether using public gateways or in-home systems, are notoriously guilty of lost coverage due to blind spots and interrupted service, requiring a reset of the wireless device to regain Internet access.

2. SuperShape technology was instrumental in creating the unique shape of this Wi-Fi directional outdoor router antenna.

Some wireless connectivity problems stem from antennas with low gain and efficiency that fail to provide the required system signal strength due to propagation losses and reflections from walls and other barriers. Unwanted coupling between multiple antennas in a mobile device can also lead to interference and disruption of service.

By developing highly directional antenna reference designs (Fig. 1, ring) for multiple-input, multiple-output (MIMO) system configurations from 2 × 2 to 8 × 8 in array size, Antenna Company improved Wi-Fi antenna performance, such as increased coverage areas under line-of-sight (LOS) and non-LOS conditions. On top of that, it dramatically reduced the size of the antenna arrays compared to conventional microstrip antenna technologies.

-Prof. Harsha Gawari (E&TC)
Automobile – Training on ATV design & development

Mechanical training on PLC
प्यार खामोश ही बयान होता है...

शब्दों मे तो सिर्फ बूँदों को लिखा जा सकता है ..भीगने के एहसास को नहीं ..

नाम देके बंध जाते है रिसते... में प्यार को शब्दों मे बंधना नहीं चाहता ..

पंछी आजाद ही जिंदा होता है ..

प्यार खामोश ही बयान होता है!

उस एहसास को शब्दों मे कैसे बताएँ जो तेरे रुबर होता है..

उसे सिर्फ खामोशी मेहसूस करती है ...

तेरा नाम आता है तो धड़कन खामोश हो जाती है...

खामोशी से बढ़कर भी कहा कोई संगीत होता है....

वो तेरे ज़ि़्क्र की मेहफिल मे जोहेन की खामोशी से निकलता है...

प्यार खामोश ही बयान होता है !

समझना हो मुझको तो मेरे शब्दों को मत सुनना ..

उसके पीछे की खामोशी को सुनना ....

की सच की कोई जुबान नहीं होती...वो शब्दों से मैला हो जाता है ... 

प्यार खामोश ही बयान होता है !

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