Microwave devices based on glide-symmetric EBGs

O. Quevedo-Teruel [(1)]
(1) KTH Royal Institute of Technology, SE-10044 Stockholm, Sweden; e-mail: oscarqt@kth.se

Periodic structures possess glide symmetry if they are invariant after a translation and a mirroring [1]. The electromagnetic properties of one-dimensional glide-symmetric periodic structures were first studied in the 60's and 70's [1, 2]. These properties were analyzed with the generalized Floquet theorem [2], demonstrating that the study of sub-unit cells and their interaction is enough to characterize the full periodic structure.

It was not until the 2016, when two-dimensional structures were researched. In [3], it was reported that glide-symmetric structures are less dispersive than conventional periodic structures. Also, they were more isotropic and with the same dimensions, they can produce higher effective refractive index. These properties can be utilized to produce broadband lenses, which find application, for example, in 5G antennas [4].

Another interesting feature of glide symmetry is that it increases the bandwidth of stopbands and EBGs, as well as their attenuation levels. This property has been proposed for producing cost-effective gap waveguide technology [5], flanges for high frequency transitions [6] and fully metallic filters [7], which are a competitive alternative to conventional waffle-iron filters.

At the conference, I will explain the fundamentals of operation of glide-symmetric periodic structures and their inherent differences with conventional ones. I will summarize the analysis methods that have been proposed in the literature, and I will explain the opportunities of these structures to produce cost-effective EBGs which can be used in future applications such as 6G, satellite communications, automotive and surveillance.

References

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