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A metallic wire electromagnetic crystal structure for radar applications

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Abstract

In this chapter, an electromagnetic crystal (EC) composed of one radiating element enclosed inside a metallic wire structure is presented for radar applications. The new radar does not contain any mechanically rotating element and the space scanning is performed by exploiting the frequency dispersion of the radiation patterns of this type of EC. Indeed, their radiation patterns consist of narrow beams whose steering angles vary with the frequency; the target direction is determined by the frequency of the signal reflected on the radar system. Since the target direction is discriminated in frequency, the different radiation patterns needed for the radiolocation are deployed simultaneously in time, which makes the proposed radar capable of tracking targets moving, in theory, at the order of light speeds. To present the developed approach, both theoretical study and numerical simulations using finite difference time domain (FDTD) method are given. To validate the developed approach, experimental measurements are also presented and discussed. © Springer Science+Business Media, LLC 2010.

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