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Tittle

Design of highly directive cavity type terahertz antenna for wireless communication

Source

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Abstract

In this paper, a cavity type dipole antenna at the terahertz frequency regime of the electromagnetic spectrum is investigated. To improve the directivity of the proposed dipole antenna at this frequency, an effective medium approach along with the ray-tracing technique have been used to investigate a unit-cell of the frequency-selective-surface (FSS) and its effect on the directivity of the antenna is presented. The predicted value of the directivity of the proposed antenna at 610 GHz has been compared with the simulation results. The simulation has been performed by using the two different commercially available simulators: a) CST Microwave Studio based on the finite integral method and b) Ansoft HFSS based on the finite element method. Further, to improve the directivity of the proposed antenna, two lateral side-walls have been placed at boundaries and its effect on the antenna directivity has been analyzed. On this way, the directivity of the antenna has been increased up to 19 dBi at the proposed frequency. Further, the structure has been scaled down by a factor of 20 and performance of the antenna at 30.6 GHz has been re-examined and it shows the similar results as obtained at 610 GHz. Finally, the method discussed in the manuscript and the directivity of the proposed antenna has been compared with various reported literatures. (C) 2011 Elsevier B.V. All rights reserved.