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Author: Mr. Mingtao Zhang
China Academy of Space Technology (CAST), China, mtzhang@126.com

DESIGN OF RECONFIGURABLE REFLECTARRAY ANTENNA WITH SUM/DIFFERENCE BEAM PATTERNS

Abstract

Based on reconfigurable reflectarray element, a large reflectarray antenna of sum/difference beam pattern which is able to steer the beam in a definite range, is designed and discussed in this paper. The element is a dual polarization reconfigurable elementary cell, achieved by special microstrip antenna architecture. By controlling the applied reconfigurable circuit, the polarization rotating orientation of the reflected wave can be changed, furthermore the single bit phase shift adjustment is realized to alter the direction of antenna beam or to transform the radiation pattern. Polarized grid is employed to build the dual reflected configuration, the reconfigurable reflectarray antenna of low profile is obtained, and the sum/difference beam can be formed by changing the reflected phase offset in only two states in the operating band. In the synthesis of array for difference beam, the Intersection Approach is used in optimization of pattern under single bit digital phase shift. The design of this reconfigurable reflectarray antenna described in the paper is validated by analysis and calculation, and the mode of single bit digital phase shift is feasible for beam forming, whose influence on the performance of sum/difference beam is assessed. Several advanced technologies involved in the design endow the antenna with complex function, adjustable performance or operating mode, which show some feature of smart antenna leading the development of antenna in the future.