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LAYOUT OPTIMIZATION OF MASSIVE DEEP-SPACE ANTENNA ARRAY ELEMENTS

Abstract

With the development of technology for deep space exploration, the distance of deep space exploration is farther and farther. The reception of weak signal becomes one of the major technical problems in the field of aerospace monitoring. A straightforward way to improve weak signals received SNR is to create greater physical aperture antennas, but more effective and feasible method is to set the antenna array. Antenna array is composed of many small aperture antennas which receive signals from the same spacecraft, and the signal of antenna array is associated synthesized to obtain the final output high SNR signal. Compared with the large-diameter antenna at the case of the same or even higher gain, the antenna array can greatly reduce the construction cost, and improve the reliability and flexibility of the system. An important problem in the construction of large-scale antenna array is how to optimize the geographical layout of the antenna elements. Different antenna element layout has a great influence on the synthesized pattern of the array. In this paper, the constraints of antenna array elements layout are proposed, and the mathematical analysis model of antenna array elements layout optimization is established, and the antenna array elements layout has been optimized using different optimization algorithms, and the best layout program is given at the last.