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OPTIMAL GROUND COVERAGE OF MULTIBEAM MOBILE COMMUNICATION SATELLITE IN
INCLINED GEOSYNCHRONOUS ORBIT

Abstract

Ground coverage region of multibeam mobile communication satellite in inclined geo-synchronous orbit is not fixed because the geometry relationship from satellite to ground region is changed continually. If multibeam antenna arrangement is designed according to the edge of ground service region, it is impossible to cover whole ground service region during every orbit period. To solve the problem, one method is using beam pointing mechanism to adjust every beam's pointing according to the geometry relationship from satellite to ground region, another method is adding more beams to make the whole ground coverage large enough. The first method is very complicated for application; the second method will increase payload weight and power consumption. In this paper, a different method is presented. Firstly, multibeam antenna pointing is optimized to minimize the different between ground coverage region and ground service region in a whole orbit period. Then the uncoverage region is filled by antenna beam remaping through digital beam forming technology. Simulation and analysis of a practical example shows that this method can solve the uncoverage problem effectively.