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MIMO TECHNIQUE APPLICATIONS IN SATELLITE COMMUNICATION SYSTEMS

Abstract

Multiple-input multiple-output (MIMO) technique has become a key technique in 4G mobile communication systems which also can be employed in the satellite communication domain. MIMO systems that employ antenna arrays at both transmitter and receiver side enhance system performances and capacity in virtue of the spatial diversity gain and multiplexing gain. However, for the special characteristics of the satellite communication, the MIMO technique application should be designed fully considering the delay, the payload, the attitude and so on.

In the paper, MIMO technique applications in the scenarios of single/multiple satellites are proposed according to the characteristics of satellite communication systems. Firstly, the system capacity of MIMO satellite communication system with regenerative payload and transparent payload is analyzed. Accordingly, MIMO schemes are designed for single/multiple satellites adopting Orthogonal Space-Time Block Code (OSTBC) and its improved distributed form. Finally, the factors affecting the performance of MIMO satellite communication systems are discussed.

Compared with point-to-point satellite communication systems, MIMO systems significantly improve system capacity and spectral utilization efficiency. The use of OSTBC and its improved distributed form further improves the performance of MIMO satellite communication systems.