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COVERAGE OF THE LUNAR SURFACE BY SATELLITES ON HALO ORBITS AND DISTANT  
RETROGRADE ORBITS**Abstract**

The communication/navigation (CN) satellite system is of vital importance to lunar exploration. Halo orbits about the Earth-Moon L1 and L2 points are well-known for their potential use for the communication relay station between the Earth and the polar region or the far side of the Moon. In this paper, the coverage ability of halo orbit on the lunar surface is analyzed. After a careful study, a CN constellation composed of only 3 halo satellites with one-fold coverage of both the north and the south pole is proposed. While having good coverage of the north/south poles, the halo orbits used by us have poor coverage of equatorial regions. To compensate for this deficiency, another special kind of orbits—the distant retrograde orbit (DRO)—is proposed. Contrary to halo orbits, the DROs have good coverage of equatorial regions but poor coverage of the polar regions. By simultaneously using the halo orbits and the planar DROs, a lunar CN constellation composed of only 5 satellites with one-fold coverage of the full lunar surface is proposed.