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FLOWER CONSTELLATIONS IN LOCALLY GEOSTATIONARY ORBITS FOR EARTH REGIONAL COVERAGE

Abstract

Continuous full-time communication in a several regions of the Earth surface by the satellite telecommunication systems seems to be highly important practical task for different sectors of national economies. Orbit and constellation design of such a telecommunication system is usually provided by using highly elliptic orbits. The problem of orbit and satellite constellation optimization for local coverage of several region(s) of the Earth are considered in the present paper. The methodology used is based on design of set of satellite constellations, called Flower Constellation, which are generally characterized by repeatable ground tracks and suitable phasing mechanism (Daniele Mortari). At the same time the practicality of the orbital solutions designed is supported by using special methodology for Locally Geosynchronous Orbit design providing maximum duration of the observation (communication) sessions for Earth local regions (Yury Razoumny). As a result the special method for orbit and constellation design to provide coverage of several given regions with characteristics required is developed. Numerical results are represented by variants of Flower Constellations suitable for designing telecommunication systems for given constraints.Special method for design of orbits and constellations for local coverage of several Earth local regions is developed basing on the methodologies of Flower Constellation and Locally Geostationary Orbit design. Numerical results, presented and illustrated, give the picture of different ways of design of satellite constellations for observation (telecommunication) services for remote local Earth regions.