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Perspective

Determination of Angles to Geostationary Communication Satellites

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DESCRIPTION

A practical and very common trouble is the terrestrial pointing of earthbased parabolic antennas to satellites (e.g., geostationary communication satellites) and extragalactic radio sources (e.g., Very Long Baseline Interferometry (VLBI)). Greater aiming accuracy is needed for the exact pointing of optical devices to stars or the use of narrow laser beam ranging devices, pointing them to retroreflectors in orbiting space platforms. In these types of instances, the presumption is made that the earth primarily based on monitoring devices have an altazimuth mounting. Therefore, the primary objective is to decide the spatial object azimuth and altitude at some instant. These parameters are the so called look angles in the terminology popularized by scientists and engineers specializing in the electrical or electronic field. A plethora of recently has published textbooks addressed 10 students of electronic engineering treat this situation along the same premises using a spherical approximation that assumes familiarity with spherical trigonometry.

A greater rigorous and complete method is brought right here primarily based on elementary principles of ellipsoidal geodesy and straight forward definitions of coordinate systems. No solution of spherical triangles is needed in this latter implementation. The preference advocated in the present paper originates conceptually from classical equations in 3-dimensional geodesy wherein the terrestrial target has been substituted through an artificial geostationary satellite. Before the arrival of digital satellite communications, most terrestrial communication links have been installed through ground based communication lines. Beginning with the launch of the first commercial satellite, early bird, international communication technology has modified at an unanticipated pace. All global and almost all domestic long-distance television program distribution is now installed through spatial satellite connections.

An increasing quantity of global smartphone traffic in addition to all forms of domestic information and voice communications are now transmitted through satellites instead of the standard optical-fiber links or line of sight microwave terrestrial networks. To receive signals from satellite, ground-based reflector antennas are used. Reflector parabolic antennas can focus the transmitted power from a narrow region of the sky. This permits for establishment of receiving signals over long distances, minimizing transmitted electromagnetic power requirements. However, due to the fact the signal is focused in a narrow region of the sky, the antenna need to be exactly pointed on the emitting or receiving source. The problems in pointing an antenna can range from simple to complex, depending on the movement of the satellite in its orbit. Most communication satellites use circular geostationary orbits. In this specific situation, the satellite remains above a fixed region on the earth's equator at a regular geocentric distance.

CONCLUSION

This significantly allows pointing at the satellite from a ground based antenna while the satellite is above the observer horizon. Aside from data transfer from satellites, dish antennas are generally used in radio astronomy for studying extraterrestrial radio sources. The problem of pointing towards a celestial object, as opposed to a geostationary communication satellite, is complex because of the earth's rotation. The apparent location of the object on the celestial sphere continuously changes with time and among others, results of precession, nutation and polar movement need to be taken into consideration.

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