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Antennas for International Satellite Communications

During the 1970s and 1980s, with the increasing role of communication satellites in international communications, advancements were made in the size and performance of antenna. For the Intelsat V satellite, to make effective use of frequencies, there has been demand for an antenna with excellent cross-polarization characteristics, which allows both the satellite and earth stations to share frequencies using orthogonal polarization. In Japan, research and development into high performance antennas for satellite communications such as dielectric loaded antennas, multi-mode horn antennas, offset Gregorian antennas, and shaped beam horn reflector antennas has advanced and has been put into practical use.

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Antennas and Electromagnetic Radiation in Plasma in Nuclear Fusion

In order to conduct communication and observation under plasma conditions such as in space and nuclear fusion, it is important to design antennas operating in plasma conditions and to clarify antenna characteristics. Since the 1960s, research on antennas and electromagnetic radiation in plasma has been advanced, and the propagation characteristics of electromagnetic waves along the infinite conductors in plasma, and the transmission and reception directivity characteristics of electron plasma waves using the dipole antenna have been clarified. These results have contributed to space development and nuclear fusion research.

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Fundamental Research in the Early Days of Digital Mobile Communications

In the 1990s, mobile communication spread rapidly, and fundamental research was advanced towards the digitalization of mobile communication in order to respond to the rapid increase in demand. Efforts were diverse, such as exploring the quasi-microwave band (1-3GHz), which was not used in mobile communications, elucidating and measures for received signal distortion due to multipath propagation and developing linear digital modulation systems suitable for mobile communication. These achievements can be said to have laid the foundation for the development of subsequent digital mobile communications.