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Phased Array Antenna

In a multi-element phased array antenna that changes the beam three-dimensionally, A "secondary phase feeding method" was proposed to reduce the degradation of side lobe characteristics due to the quantization error of the digital phase shifter, and a design method was established. In addition, dynamic theory on changes in the current distribution on the device based on the coupling between the devices in response to changes in the combination of supply voltages was clarified, and the "ICT (Improved Circuit Theory) method" suitable for computer-based design was established. These results have greatly contributed to the practical application of multi-element phased arrays used in radar, aircraft landing aids, etc.

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Car Phone Systems

The world's first mobile phone experiment was conducted by users, released as a wireless telephone at the Osaka Expo in 1970. On December 3, 1979, Nippon Telegraph and Telephone Public Corporation commercialized the world's first car phone system using an 800 MHz band that enables automatic connection and tracking and exchange control. After that, by narrowing the wireless channel bandwidth and using new mobile communication network configuration technology and mobile switching technology, a large-capacity car phone system with a subscriber capacity per band of 2 to 4 times that of the past was put into practical use. The results of this technology development have been used in subsequent car phone and mobile phone systems. In particular, the electric field strength curve elucidating the radio wave propagation characteristics is widely known worldwide as the "Okumura curve".