

第V部 将来への展望

(II) 新しい応用面の開拓

V. VIEW TO THE FUTURE VLBI

(II) PIONEERING NEW VLBI FIELD OF APPLICATION

We are now planning the VLBI experimental and/or observational items in the following chapters in future.

Recently milli-meter wave space communication has been of considerable interest for high-capacity communication channels. Propagation phenomena resulting from the existence of the troposphere and the ionosphere influence the optimum utilization of the frequency region. Although phase scintillations produced in the atmosphere near the ground were already observed in various method, few measurements have been conducted along the satellite down links. In chapter V-7., a measurement of phase scintillation of satellite noise by VLBI technique is proposed.

The latest planetary physics is approached from the three different angles. They are, direct measurement by space vehicles, such as pioneer series; investigation of the origin of the solar system by chemical analyses of meteorites; and the remote sensing using VLBI technique, which is the main subject in Chapter V-8.

Because VLB fringes take shape thin beam pattern enough to resolve the greater part of planets, VLBI will be able to play an active part in determination of the thermal distribution of planetary surface and in investigation of the mechanism of the Jovian decimetric and decametric wave emissions.

In chapter V-9., some examples of celestial radio sources recently resolved by VLBI observation, especially by closure phase method, are given at first. Next, computer simulations of beam pattern formed among two or three antenna are introduced together with some theoretical formulas.

Hectometric observations of radio stars on the ground are not possible because of existence of the ionosphere. Even if the observation could be carried out at any condition, the angle resolution would be limited to several degrees or more. VLBI between two antennas mounted on each synchronous satellite will enable us to observe radio stars with high resolution at hectometric region and perhaps to find out a new aspect of physical phenomena. In chapter V-10., several problems

and prospects of hectometric VLBI between geosynchronous satellite are discussed.

VLBI technique offers one of the most accurate means in time synchronization. In chapter V-11., this technique is discussed in comparison with other techniques of time synchronization.

Determination of accurate distance between two antennas is one of the most popular and of the important application of VLBI technique. In chapter V-12., many examples of short baseline interferometric experiments are introduced in the application to geodesy and to crustal deformation monitoring, developed in U.S.A. There is also a description of geodetic development by VLBI measurements, being compared with the conventional geodesy so far.

Direction of the baseline of radio astronomical interferometer gives us very precise data for astrometry. In chapter V-13., right ascension and declination of the small radio source, universal time, and polar motion of the earth are considered. Development of practical system is expected to be very important for VLBI measurement in near future.

