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Interferometry and Synthesis Imaging; 2.1 Planar Analysis; 2.2 Effect of Bandwidth; 2.3 One-Dimensional Source Synthesis; Interferometer Response as a Convolution; Convolution Theorem and Spatial Frequency; Example of One-Dimensional Synthesis; 2.4 Two-Dimensional Synthesis
Projection-Slice Theorem3 Analysis of the Interferometer Response; 3.1 Fourier Transform Relationship between Intensity and Visibility; 3.2 Cross-Correlation and the Wiener-Khinchin Relation; 3.3 Basic Response of the Receiving System; Antennas; Filters; Correlator; Response to the Incident Radiation; Appendix 3.1 Mathematical Representation of Noise-Like Signals; Analytic Signal; Truncated Function; 4 Geometric Relationships and Polarimetry; 4.1 Antenna Spacing Coordinates and (u, v) Loci; 4.2 (u', v') Plane; 4.3 Fringe Frequency; 4.4 Visibility Frequencies; 4.5 Calibration of the Baseline 4.6 Antenna Mounts4.7 Beamwidth and Beam-Shape Effects; 4.8 Polarimetry; Parameters Defining Polarization; Antenna Polarization Ellipse; Stokes Visibilities; Instrumental Polarization; Matrix Formulation; Calibration of Instrumental Polarization; Appendix 4.1 Conversion Between Hour Angle-Declination and Azimuth-Elevation Coordinates; Appendix 4.2 Leakage Parameters in Terms of the Polarization Ellipse; Linear Polarization; Circular Polarization; 5 Antennas and Arrays; 5. I Antennas; 5.2 Sampling the Visibility Function; Sampling Theorem; Discrete Two-Dimensional Fourier Transform
5.3 Introductory Discussion of ArraysPhased Arrays and Correlator Arrays; Spatial Sensitivity and the Spatial Transfer Function; Meter-Wavelength Cross and T Arrays; 5.4 Spatial Transfer Function of a Tracking Array; Desirable Characteristics of the Spatial Transfer Function; Holes in the Spatial Frequency Coverage; 5.5 Linear Tracking Arrays; 5.6 Two-Dimensional Tracking Arrays; Open-Ended Configurations; Closed Configurations; VLBI Configurations; Orbiting VLBI Antennas; Planar Arrays; 5.7 Conclusions on Antenna Configurations; 5.8 Other Considerations; Sensitivity; Long Wavelengths Millimeter Wavelengths

Sommario/riassunto

Comprehensive, authoritative coverage of interferometric techniques for radio astronomyIn this Second Edition of Interferometry and Synthesis in Radio Astronomy, three leading figures in the development of large imaging arrays, including very-long-baseline interferometry (VLBI), describe and explain the technology that provides images of the universe with an angular resolution as fine as 1/20,000 of an arcsecond.This comprehensive volume begins with a historical review followed by detailed coverage of the theory of interferometry and synthesis imaging, analysis of interferomete