

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Fixed and Broadcast Communications (3)

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DEMONSTRATION OF MONOPULSE TRACKING ANTENNA SYSTEM AND SEPARATION
DISTANCE CONSTRAINT ANALYSIS IN LAB ENVIRONMENT

Abstract

The Monopulse Tracking Systems (MPTS) are in industry since 1943 [1], these have been backbone of direction finding systems, radar tracking systems, communication satellite ground stations and now are finding place in new emerging applications in various fields such as civil air traffic control and smart antennas [2][3]. Demonstration of a MPTS with pyramidal horns at Ku band in a Lab environment is discussed in this investigation. The system is based on Σ - patterns obtained from sum and difference ports of Hybrid waveguide MPTS which is fed by two identical antennas. Due to Lab environment, there is a constraint on the separation distance between transmitting antenna and receiving MPTS because of limited available space and cabling of various units. MPTS gives a deep null in the direction of the transmitting antenna, when its two antennas receive nearly equal power, which is possible when the separation distance between MPTS and transmitting antenna is greater than a minimum threshold distance. A detailed analysis of the minimum threshold distance that should be maintained between MPTS and transmitting antenna for specific gain difference between the two antennas of MPTS and the angular displacement that can be tracked has been carried out using measured radiation pattern of the transmitting antenna. For smaller distances, the angular tracking range is also limited. The results are verified by measurements on Network Analyzer (PNA). The setup is arranged with available resources at Lab; however missing components are designed and manufactured at the in-house RF workshop.