INTRODUCTION TO RADAR SYSTEMS

UNIT–III

Lecture–3

Monopulse Tracking

- An example of a simultaneous-lobing technique is amplitude-comparison monopulse, or more simply, monopulse.

Contd.

- In both the sequential-lobing and conical-scan tracking techniques, the measurement of angular error in two orthogonal coordinates (azimuth and elevation) requires that a minimum of three pulses be processed.
- In practice, however, the minimum number of pulses in sequential lobing is usually four—one per antenna position.

Contd.

- Conical scanning usually requires more than four pulses to derive the error signal.
- Pulse-to-pulse amplitude fluctuations of the echo signal have no effect on tracking accuracy if the angular measurement is made on the basis of one pulse rather than many.
- There are several methods by which angle-error information might be obtained with only a single pulse.

Contd.

- More than one antenna beam is used simultaneously in these methods, in contrast to the conical-scan or lobe-switching tracker, which utilizes one antenna beam on a time-shared basis.

Amplitude-comparison monopulse.

- The amplitude-comparison monopulse employs two overlapping antenna patterns to obtain the angular error in one coordinate. The two overlapping antenna beams may be generated with a single reflector or with a lens antenna illuminated by two adjacent feeds.
- The sum pattern is used for transmission, while both the sum pattern and the difference pattern are used on reception.

Contd.

- The sum and difference signals are multiplied in a phase sensitive detector to obtain both the magnitude and the direction of the error signal.
- In this technique the RF signals received from two offset antenna beams are combined so that both the sum and the difference signals are obtained simultaneously.

Contd.

- The signal received with the difference pattern provides the magnitude of the angle error.
- The sum signal provides the range measurement and is also used as a reference to extract the sign of the error signal.
- Signals received from the sum and the difference patterns are amplified separately and combined in a phase-sensitive detector to produce the error-signal characteristic.

Contd.

- The two adjacent antenna feeds are connected to the two arms of a hybrid junction such as a "magic T," a "rat race," or a short-slot coupler.
- The sum and difference signals appear at the two other arms of the hybrid.
- On reception, the outputs of the sum arm and the difference arm are each heterodyned to an intermediate frequency and amplified as in any superheterodyne receiver.