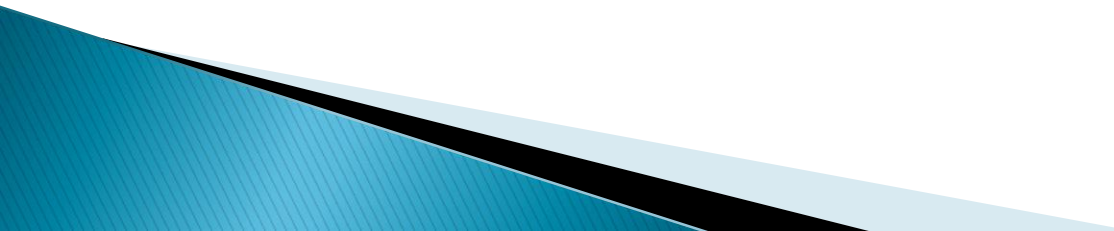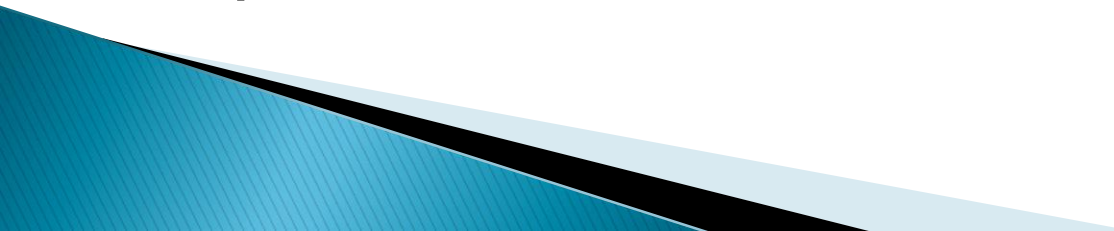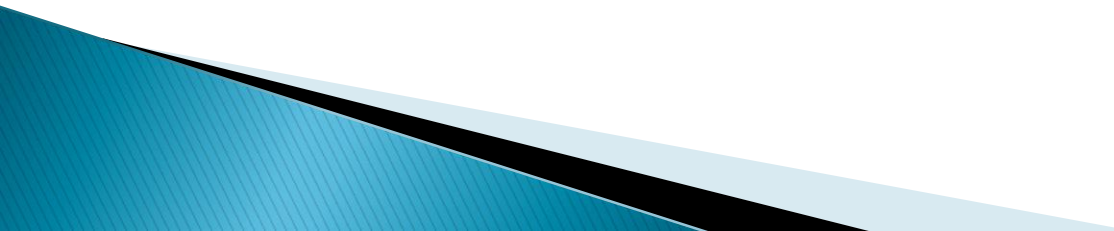# INTRODUCTION TO RADAR SYSTEMS

UNIT–III

Lecture–7

Phase-comparison Mono pulse

▸ The tracking techniques discussed thus far in this chapter were based on a comparison of the amplitudes of echo signals received from two or more antenna positions.

▸ The sequential-lobing and conical-scan techniques used a single, time-shared antenna beam, while the mono pulse technique used two or more simultaneous beams.
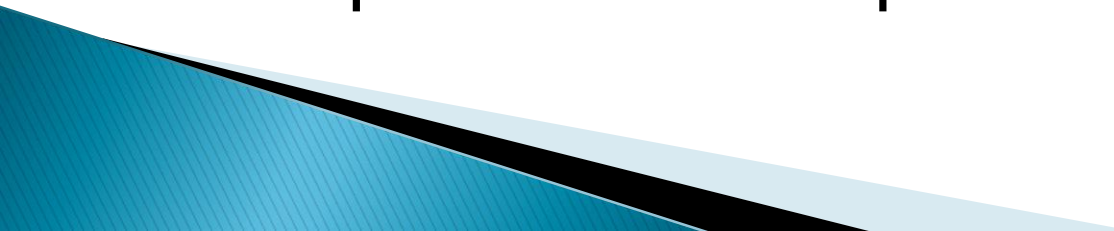
Contd.

▸ The angle of arrival (in one coordinate) may also be determined by comparing the phase difference between the signals from two separate antennas.

▸ Unlike the antennas of amplitude-comparison trackers, those used in phase-comparison systems are not offset from the axis. The individual boresight axes of the antennas are parallel, causing the (far-field) radiation to illuminate the same volume in space.

Contd.

- The amplitudes of the target echo signals are essentially the same from each antenna beam, but the phases are different.

- The measurement of angle of arrival by comparison of the phase relationships in the signals from the separated antennas of a radio interferometer has been widely used by the radio astronomers for precise measurements of the positions of radio stars.

Contd.

- The interferometer as used by the radio astronomer is a passive instrument, the source of energy being radiated by the target itself.
- A tracking radar which operates with phase information is similar to an active interferometer and might be called an interferometer radar.
- It has also been called simultaneous-phase-comparison radar, or phase-comparison mono pulse.

Contd.

- The difference in amplitudes in the several antenna positions was proportional to the angular error.

- There are two reasons why this might be so.

- First, the sidelobe levels which result can sometimes be higher than those from a single reflector, and second, the phase comparison radar does not usually make efficient use of the total available antenna aperture.

Contd.

- Two antennas are separated by a distance d. The distance to the target is R and is assumed large compared with the antenna separation d.

- The line of sight to the target makes an angle 6 to the perpendicular bisector of the line joining the two antennas. The distance from antenna 1 to the target is calculated.

Contd.

▸ Although tracking radars based upon the phase-comparison principle have been built and found to track aircraft satisfactorily, this technique has not been as widely used as some of the others discussed.