PREFACE

Equatorial F region exhibits many interesting phenomena specific to the equatorial region. Prominent among these are the post sunset (pre-reversal) height rise, the equatorial anomaly (Appleton anomaly) and the behaviour of zonal plasma drifts. In all these, the electrodynamics of the F region plays the most important role. During the last two decades the importance of thermospheric dynamics in affecting the F region processes came to be increasingly recognized especially through F region dynamo mechanism. In order to understand the role of thermospheric winds on F region dynamics on a quantitative basis, systematic observations on thermospheric winds are necessary. The author has developed a method of determining the nighttime equatorial thermospheric meridional winds from ionograms at two equatorial stations with one at the magnetic equator and the other away from it (latitudinally). Using this method the author has carried out studies on the nighttime equatorial thermospheric meridional winds using data over a period of two years. The author has also carried out a detailed study on the nighttime F region vertical drifts including the post sunset enhancement and on the coupling of equatorial E and F regions in the post sunset period. The results of these studies are embodied in this thesis.

The thesis consists of six chapters. In Chapter-I, a brief introduction to the subject of F region dynamics is given.

Using h'F data from ionograms recorded at Trivandrum (geographic lat. 8.5° N, long. 77° E; magnetic dip ~0.5° N), the nighttime vertical drift and the causative zonal electric field have been obtained. The seasonal variations and solar activity dependence of the vertical drift have been studied. The results of these studies are incorporated in Chapter-II.
Chapter-III contains the results of an investigation on the E and F region electric fields using the simultaneous observations from ionosonde and Trivandrum VHF backscatter radar.

The method of deriving the nighttime equatorial thermospheric meridional winds from ionogram data of h'F at two equatorial stations Trivandrum and SHAR (geog. lat. 13.7° N, long. 80.2° E; dip ~10° N) is described in Chapter-IV. Using this method the seasonal variations of the meridional winds have been studied and the results of these studies are presented in Chapter-V.

In Chapter-VI, a summary of the results of the studies carried out by the author is given.