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PEM06-02 Room:A01 Time:May 26 16:45-17:00

Three-dimensional plasma bubble simulation driven by whole atmosphere-ionosphere coupled model

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Equatorial plasma bubble (EPB) is a well-known phenomenon in the equatorial ionospheric F region. As it causes severe scintillation in the amplitude and phase of radio signals, it is important to understand and forecast the occurrence of EPB from a space weather point of view. The development of EPB is known as a evolution of the generalized Rayleigh-Taylor instability. Numerical modelings of the instability on the equatorial two-dimensional plane have been conducted since the late 1970's, and the nonlinear evolution of the instability has been clearly presented. Recently, three-dimensional (3D) modelings became popular tools for further understanding of the development of EPB such as 3D structure of EPB, meridional wind effects and gravity wave seeding.

We have developed a new 3D high-resolution bubble (HIRB) model for EPB and presented nonlinear growth of EPB which shows very turbulent internal structures such as bifurcation and pinching. The eastward neutral wind in the evening produced reverse-C shape of EPB as frequently observed by various instruments. We are trying to integrate the high-resolution model for EPB with the whole atmosphere-ionosphere coupled model (GAIA) to study the growth of EPB under the realistic background conditions. The background electric field and neutral wind partially controlled by forcing from the lower atmosphere may cause the day-to-day variability of EPB occurrence.

Keywords: plasma bubble, equatorial ionosphere, simulation, GAIA model, HIRB model