



## **The 3-D simulation of Collisional-Interchange-Instability: Coupling between equatorial and low-latitude dynamics**

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We are presenting the 3-D simulation of Collisional-Interchange-Instability (CII) in the equatorial and low-latitude E and F region of ionosphere. The CII is the general term for the Gradient-Drift-Instability in the E region and Rayleigh-Taylor-Instability (RTI) in the F region. The CII gives rise to the irregular structures, known as sporadic E and spread F, in the ionosphere and significantly affects the propagation of radio waves used in the navigation systems. The objective of the present investigation is to simulate the equatorial spread F and then study its effects onto the low-latitudes. We further study the effects of off-equatorial sporadic-E onto the evolution of spread F. The simulation model solves the coupled non-linear potential and electron continuity equations in the Cartesian-Coordinate system. The potential equation is obtained from the Poisson equation under charge-neutrality condition. The potential equation is solved under Successive-Over-Relaxation (SOR) scheme while continuity equation is solved under Crank-Nicholson implicit scheme. The same simulation model is implemented to obtain the ambient ionospheric density profile in the meridional plane which is one of the required input for the simulation of the CII .