

空间物理学★大气物理学

赤道电离层R-T不稳定性发展的控制因素分析

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**摘要** 本文从质量和电荷守恒方程出发,分析了控制电离层等离子体R-T不稳定性线性增长的各种因素,重点研究了热层风和背景电场的空间梯度对R-T不稳定性线性增长的影响.结果表明,热层风场和背景电场两者的空间梯度对R-T不稳定性线性增长有不可忽视的促进或抑制作用;对R-T不稳定性线性增长起促进作用还是起抑制作用,依赖热层风场和背景电场及其空间梯度的方向;对R-T不稳定性线性增长影响的显著程度主要依赖于热层风场和背景电场两者空间梯度的大小.数值计算结果表明,对典型的背景电离层条件,磁力线顶点高度为330 km时,对线性增长率的影响最高达到120%.

**关键词** [电离层](#) [不规则结构](#) [R-T不稳定性](#) [线性增长率](#) [电场梯度](#) [风场梯度](#)

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Analysis of controlling factors leading to the development of R-T instability in equatorial ionosphere

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**Abstract** In this paper the effect of the spatial gradients of the electric field and the neutral wind on the linear growth of the plasma R-T instability and its growth rate are analyzed, based on the quality and the charge conservation equation. The results reveal that, both electric field spatial gradients and neutral wind spatial gradients can promote or restrain the growth of R-T instability remarkably, which depends on the orientation of the electric field and the neutral wind as well as the polarity of their gradients; and the degree of the influence depends on the magnitude of their spatial gradients and the ratio of the parallel to Pedersen conductance and the ratio of the parallel to transverse wave number for the transverse gradients of the electric field and the neutral wind. Numerical results show that, for the typical ionospheric background condition, the electric field gradients and neutral wind gradients can make the growth rate of R-T instability increase or decrease 10% to 120% for different scale lengths.

**Key words** [Ionosphere](#); [Irregularity](#); [R-T instability](#); [Linear growth rate](#); [Gradient of electric field](#); [Gradient of thermospheric wind](#)

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