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论文

龙卷风的漏斗结构理论

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摘要: 龙卷风是大气中风速和垂直速度极大的小尺度系统. 本文用气压梯度力、惯性离心力、黏性力三力平衡的柱坐标(r, θ, z)下的大气动力和热力学方程组, 求龙卷风的三维速度场(v_r, v_θ, v_z), 从理论上绘制出龙卷风的三维漏斗型结构. 充分说明龙卷风由涡旋流和急流这两种流叠加而成, 涡旋流是由惯性离心力造成的, 急流是由水平辐合辐散而引起的强对流. 龙卷风是在极端不稳定的大气层结中形成的.

关键词: 龙卷风 漏斗结构 涡旋流 急流 大气科学

theory on the funnel structure of tornado

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Abstract: Tornado is a small scale system which as the maximal horizontal and vertical velocities in the atmosphere. From the governing equations satisfying the balance

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between pressure gradient force, inertial centrifugal force and viscous force, the three dimensional velocities of tornado are obtained, and then its funnel structure is depicted theoretically. It shows that the funnel structure consists of vertex flow and jet flow. The vortex flow is resulted from inertial centrifugal force and the jet flow is from strong convection by the horizontal convergence. At the same time, it indicated that tornado is formed under the exceedingly unstable atmospheric stratification conditions.

Keywords: Tornado Funnel structure Vortex flow Jet flow Atmospheric sciences.

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