

Nonlinear dynamics simulations of neutral winds in the MLT region using spectral methods

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Abstract:

In this work, a detailed and systematic analysis of the hydrodynamic equations that govern the neutral winds located in the Mesosphere and Lower Thermosphere (MLT) region will be carried out, focusing on small-scale phenomena [1]. Furthermore, a set of numerical tests for hyperbolic conservation equations will be constructed to improve the characterization and interpretation of the solutions. The numerical solutions of the neutral wind models provide us information about: velocities, densities, energy, pressure, and atmospheric parameters. These numerical solutions will be analyzed to understand the formation of structures, in the neutral winds of the MLT zone, associated with gravity waves and Kelvin-Helmholtz instabilities. These regions have been difficult to probe in the past, but new experimental evidence allows a more detailed analysis of atmospheric mechanisms. Among these new experiments is the multistatic specular meteorological radar system, SIMONe Peru, developed by the Jicamarca Radio Observatory of the Geophysical Institute of Peru and the Leibniz Institute of Atmospheric Physics, Germany [2,3]. SIMONe provides us the data that will be used to test the consistency of our solutions.

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References:

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