Characterization of the cosmological nonlinear path of single galaxies in N-Body Simulations

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Abstract. *Turbulent-like behaviour is an important and recent ingredient in the investigation of large scale structure formation in the observable universe. Recently, an established statistical method was used to demonstrate the importance of considering chaotic advection (or Lagrange turbulence) in combination with gravitational instabilities in the ΛCDM simulations performed from the Virgo Consortium (VC). However, the Hubble volumes simulated from GADGET-VC algoritm have some limitations for direct lagrangian data analysis due to the large amount of data and no real time computation for particle kinetic velocity along the dark matter structure evolution. We use our COsmic LAgrangian TUrbulence Simulator (COLATUS), based on GPU/CUDA technology, to perform gravitational Cosmological N-body simulations and tracking the particles paths. In this work we discuss the chaotic advection behavior of tracers galaxies based on the angular velocity fluctuation analysis of single particles during its trajectory to the gravitational collapse of super clusters at low redshifts.*

Keywords: cosmological N body simulation, angular velocity fluctuation analysis, GPU-CUDA, chaotic advection.

Área do INPE: Ciências Espaciais e Atmosféricas