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Numerical Analysis of the Z Dependence of Cosmological Void Probability Functions[1] KEITH ANDREW, DAVID BARNABY, Western Kentucky University, BRETT BOLEN, Grand Valley State University, JAMES GARY, LISA TAYLOR, Western Kentucky University — We use a numerical N-body cosmological simulation code, Gadget II, and survey data from CfA, DEEP2, 2dF and SDSS to investigate the z dependence of the distribution of voids characterized by the Reduced Void Probability Function, RVPF. We numerically simulate the evolution of the universe on a Beowulf Cluster in a LCDM model starting from a redshift of z=50 to the current epoch at z=0 in order to generate RVPFs for $N>10^6$. GADGET-2 is an N-body/smoothed particle hydrodynamics, SPH, code that we ran in MPI parallelizable mode on a HPC Beowulf cluster. The clustering probabilities are compared to a statistical model utilizing a hypergeometric partition function representation to capture both the Thermodynamic and Negative Binomial probabilities. We model the z dependence of the void density profile to extract a nonlinear exponent equation covering all data sets indicting the time evolution of the cosmic void structure. We find the value of the generalized partition function that gives the best fit to the model and the available observational data.

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