Angular Momentum Growth around Local Density Maxima

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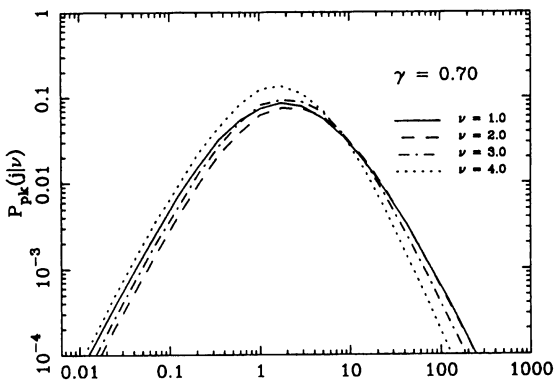
ABSTRACT. We have calculated the growth of angular momentum about local density maxima at early epochs. We find that high peaks experience higher torques than low peaks, counteracting the short collapse time during which the high peaks can acquire angular momentum. Which effect is dominant depends on the perturbation power spectrum: for power spectra characteristic of both cold dark matter and hot dark matter, the effects nearly cancel, and the total angular momentum acquired by a collapsing object is almost independent of the height of the peak. Furthermore, the distributions of angular momenta acquired by collapsing protosystems are extremely broad, for all power spectra, far exceeding any modest differences between peaks of different height.

These results indicate that it is not possible to account for the systematic differences in angular momentum properties of disk and elliptical galaxies simply by postulating that the latter arise from fluctuations of greater overdensity, contrary to some recent suggestions. The figure shows the probability distributions for the final angular momentum acquired by peaks of dimensionless height 1–4, for a power spectrum similar to cold dark matter. A fuller account of this work has been submitted to MNRAS.

Final Angular Momentum Distribution



J. Audouze et al. (eds.), Large Scale Structures of the Universe, 552.