Acquisition of angular momentum in the proto-galactic phases.

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Following Peebles (Ap.J.155,393;Astron.Astrophys.11,377)and Efstathiou and Silk (Fund.Cosm.Phys.9,1) we assume that a developing proto-galaxy of mass $M=10^{11}M_{\odot}$ gains angular momentum during a first Phase 1 extending from recombination to the maximum expansion and then a second Phase 2 from the maximum expansion to a relaxed virialized structure passing through an intermediate Phase I.A very simple model is proposed in which a first mechanism connected with increasing density perturbations leading to a torque $\sim t^{2/3}$,is applied to a spherical homogeneus structure. The initial conditions for its dynamical evolution are taken from a cosmological flat model ($\Omega=1$) with an isothermal perturbation mass spectrum. Phase 2 begins when the proto-galaxy is completely separated from the background and until this Phase it has been recognized that the initial spherical symmetry turns out to be well preserved, provided the angular momentum gained does not exceed $3.6\ 10^{73}$ g cm^{2}sec^{-1}. The initial conditions of the Phase 2 are found by assuming: i)angular momentum and energy conservation, ii)a distorted rigidly rotating polytrope as reference configuration in virial equilibrium;thus one is able to determine the major semiaxis and the axis ratio of the system,which now turns out to gain angular momentum by quadrupole interaction with the surrounding systems.

The main conclusion is that different amounts of angular momentum are able to produce a significant morphological differentiation only at the end of maximum expansion;the evolution of the major semiaxis in the previous phases being not too different from that of the related non rotating sphere. The method,built up in dimensionless variables, allows to extend the results in the whole mass range under consideration.

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