THE MASS FUNCTION OF COSMIC STRUCTURES

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We have investigated some modifications to the Press & Schechter (PS) (1974) prescription resulting from shear and tidal effects (Audit & al. 1997a). These modifications rely on more realistic treatments of the collapse process than the standard approach based on the spherical model.

First, we have shown that the mass function resulting from a new approximate Lagrangian dynamics (Audit & Alimi 1996), contains more objects at high mass, than the classical PS mass function and is well fitted by a PS-like function with a threshold density of $\delta_c \simeq 1.4$. However, such a Lagrangian description can underestimate the epoch of structure formation since it defines it as the collapse of the first principal axis. We therefore have suggested some analytical prescriptions, for computing the collapse time along the second and third principal axes, and we have deduced the corresponding mass functions. The collapse along the third axis is delayed by the shear and the number of objects of high mass then decreases. Finally, we have shown that the shear also strongly affects the formation of low-mass halos. This dynamical effect implies a modification of the low-mass slope of the mass function and allows to reproduce the observed luminosity function of field galaxies.

Comparing the above analytical work with numerical simulations, we have shown that, in the framework of our extended PS formalism, it was possible to build a picture of the mass function coherent from both a statistical and a dynamical point of view (Audit & al. 1997b).

References

Audit, E. & Alimi, J-M., 1996, "Gravitational Lagrangian Dynamics of cold matter using the deformation tensor.", A&A, **315**, 11

Audit, E., Teyssier, R. & Alimi, J-M., 1997a, "Non-linear dynamics and the mass function of cosmic structures: I. Analytical results", A&A, **325**, 439

Audit, E., Teyssier, R. & Alimi, J-M., 1997b, "Non-linear dynamics and the mass function of cosmic structures: I. Numerical results" A&A, submitted

Press, W.H. & Schechter, P., 1974, "Formation of Galaxies and cluster of galaxies by self-similar gravitational condensation", ApJ, **188**, 425

K. Sato (ed.), Cosmological Parameters and the Evolution of the Universe, 242.
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