THE EFFECTS OF SPATIAL CORRELATIONS ON MERGER TREES OF DARK MATTER HALOS

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The effects of spatial correlations of density fluctuations on merger histories of dark matter halos (so-called '*merger trees*') are analyzed (Nagashima & Gouda 1997). We compare the mass functions of dark haloes derived by a new method for calculating merger trees, that proposed by Rodrigues & Thomas (1996), with those given by other methods such as the Block model, the Press-Schechter formula and our own formula in which the mass functions are analytically expressed in a way that takes into consideration the spatial correlations (Yano et al. 1996). It is found that the mass functions given by the new method are well fit by those given by our formula. We believe that the new method *naturally* and correctly takes into account the spatial correlations of the density fluctuations due to a calculated, grid-based realization of the density fluctuations, and so is very useful for estimating the merger tree accurately in a way that takes into consideration spatial correlations.

Moreover, by applying our formula, we present an analytic expression which reproduces the mass function derived by the Block model. We therefore show clearly why and how the mass functions given by the new method and the Block model are different from each other. Furthermore, we note that the construction of merger trees is sensitive to the criterion of collapse and merging of overlapped halos in cases in which two or more halos happen to overlap. In fact, it is shown that the mass function is very much affected when the criterion of overlapping is changed.

References

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