Modification to the Calculation of a Two-point Correlation Function[1] SANHA CHEONG, Univ of Rochester — We suggest a modification to the calculation of a two-point correlation function $\xi(s) = \frac{DD(s) - 2DR(s) + RR(s)}{RR(s)}$ commonly used in the analysis of large-scale structures in cosmology. Traditionally, it is known that the catalog of random galaxies, for efficient background elimination, has to be at least an order of magnitude larger than the target data catalog. The naïve algorithm to calculate the correlation function in the configuration space requires calculating the distances between all possible pairs of galaxies within a reasonable distance scale, which is thereby $O(n^2)$. Hence, the overall computing time is dominated by the calculations of $RR(s)$ and, to a lesser extent, $DR(s)$. The new algorithm discussed here utilizes a probability density distribution of galaxies to eliminate the background. This galaxy distribution is isotropic which implies that it is separable into a function of two angular coordinates (α, δ) and another function of radial distance represented by the redshift z. This allows for a faster computation of $RR(s)$ and $DR(s)$ by simplifying the convolution integrals. We also demonstrate that the new method suggested is statistically more robust than the conventional method.

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