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2-FAST: Fast and Accurate Computation of Projected Two-point Functions

We present the 2-FAST (2-point function from Fast and Accurate Spherical bessel Transformation) algorithm for a fast and accurate computation of integrals involving one or two spherical Bessel functions. These types of integrals occur when projecting the galaxy power spectrum $P(k)$ onto the configuration space, $\xi_\ell^\nu(r)$, or spherical harmonic space, $C_\ell(\chi, \chi')$. With the Hankel transformation of the power spectrum, we first divide the calculation into cosmology-dependent coefficients and cosmology-independent integration of basis functions multiplied by spherical Bessel functions. We find analytical expression for the latter integrations in terms of special functions, for which recursion provides a fast and accurate evaluation. The algorithm, therefore, circumvents direct integration of highly oscillating spherical Bessel functions.

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