

## Halo Profile

The Navarro-Frenk-White (NFW profile) is given by

$$\rho(r, M) \propto \frac{1}{rc/r_h(1 + rc/r_h)^2} \quad (1)$$

where  $r_h = [3M/4\pi\rho_m(z=0)\Delta_M]^{1/3}$  is the comoving radius associated with a halo of mass  $M$  at an overdensity of  $\Delta_M = 180$  with respect to the mean matter density.  $c$  is the concentration and for the purposes of this project take it to be  $c = 10$  independent of mass (we also ignore the distinction between the halo mass and virial mass). The normalization is set so that the volume integral over the halo profile out to  $R$  returns the mass  $M$ .

Compute the Fourier transform of the NFW profile for use in the 1-halo term of the halo model

$$y(k, M) = \frac{1}{M} \int_0^{r_h} dr 4\pi r^2 \rho(r, M) \frac{\sin(kr)}{kr} \quad (2)$$

normalized such that  $y(0, M) = 1$ .