Even before recombination matter and radiation are not perfectly coupled: radiation leaks out of the perturbation, which leads to dissipation of the perturbations

This process occurs because photons bounce around (following a random walk) during recombination; for small scale fluctuations the hot and cold photons can mix
⇒ on the scales corresponding to the distances photons can travel the fluctuations are damped.

The dissipation scale $\lambda_D \simeq 2 < \sqrt{\tau_{Tc} t}$ at time t

↑ mean time between Thomson scattering $\therefore \tau_{Tc} \propto \frac{1}{n_e} \propto \frac{1}{(1+z)^3}$

Before t_{eq} $\lambda_D \propto (1+z)^{-5/2}$ and $\lambda_D \propto (1+z)^{-3/2}$ after t_{eq}

The corresponding mass scale is $\rho(z) \lambda_D^3$, which gives $M_D \sim 10^{12} (\Omega_m h^2)^{-5/4} M_\odot$
at recombination: ~ cluster of galaxy scale

Without accounting for this Silk damping the amplitude of an acoustic wave on a mass scale $\leq M_D$ would remain constant during radiation domination and decay $\propto t^{-1/6}$ after t_{eq}; such structures are obliterated by photon diffusion