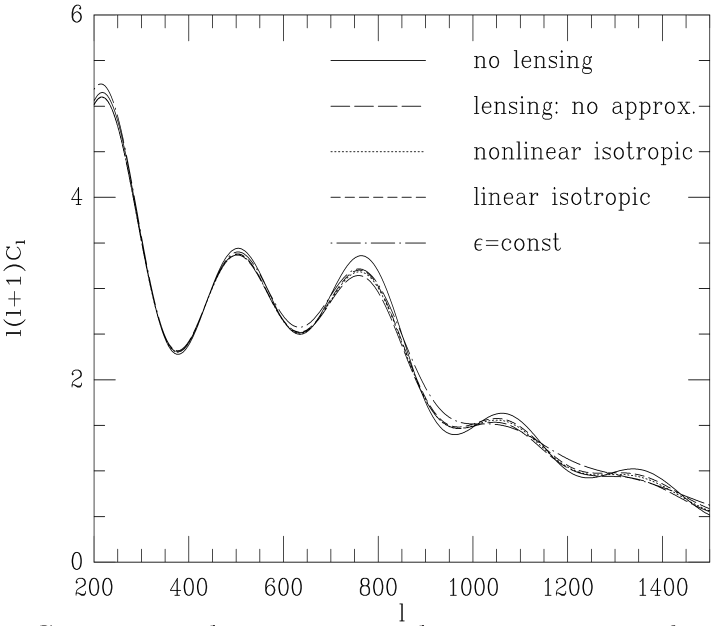


Fig. 3.— Comparison between several approximations for calculating the lensing effect on the CMB anisotropies in the COBE normalized CDM model with $h = 0.5$ and $\Omega_{m0}h = 0.5$. Both nonlinear and linear isotropic approximations gives results that are almost indistinguishable from the fully nonlinear and nonisotropic calculation over this angular range, while $\epsilon =$ const approximation gives reliable results only over a limited range of $l$ and cannot be used for an accurate calculation of the lensing effect.

($l < 2000$, see figure 3). These angular scales are thus unaffected by the uncertainties of the nonlinear evolution and are also the scales where the large-scale observations place the best constraints on the power spectrum. The approximation given in equation 9 gives reasonable results only if one adopts $\epsilon$ at $\theta \approx 4\pi l^{-1}$, which is significantly larger angle than expected (Bond 1995) and again implies that nonlinear effects are not important until very large $l$. Even then the agreement is only approximate (figure 3) and limited to $l < 1000$. In general it is better to use the isotropic approximation in equation A6 together with the Gauss-Legendre integration to calculate the lensing effect on the multipole moments, as it is not significantly harder to compute than the approximation given in equation 9.

## 4. Discussion

The lensing effect on the primary CMB anisotropies can be calculated for any cosmological model with a specified evolution of gravitational potential power spectrum. This formalism was applied to several currently popular models, which best fits the