$\delta >$
1
ρ
$\rho =$
$\bar{\rho}(1+$
$\delta)$
$\Omega_0 =$
$\Omega_{m,0} =$
1
r
$\frac{}{r^2},$
M
r
$\pi r^3 \frac{}{3\bar{\rho}(1+\delta).}$
$M(r)$
ϵ
$\epsilon =$
$\frac{1}{2}(rt)^2 -$
$\frac{GM}{r},$
$\epsilon \geq$
0
$\epsilon <$
0
$\epsilon <$
0
$\cos\theta)t =$
$B(\theta -$
$\sin\theta)A =$
$\frac{GM}{2\epsilon}B =$
$\frac{GM}{(2\epsilon)^{3/2}}$
$r(t)$
$r_{ta} =$
$2A$
$t_{ta} =$
πB
$t_{coll} =$
$2t_{ta}$
$t_{coll} =$
$2t_{ta}$
t_{coll}
$_t ex The evolution of the shell radius of a spherical overdensity, with negative total energy. The shell expands, reaches a maxium$
$\rho(t)$
t_i
$r =$
r_i
$v =$
v_i
t_i
$i =$
$(ax_i)t =$
$\dot{a}x_i no peculiar velocity, and r =$
$\frac{\dot{a}x}{}$
$Hr_i. H =$
$\dot{a}/a$
$t =$
t_i
$\pi r_i^3 \frac{}{3\bar{\rho}(t_i)(1+\delta_i), \epsilon = \frac{v_i^2}{2} - \frac{GM}{r_i}.}$
$a \propto$
$t^{2/3}$
$H =$
$2/(3t)$
$\bar{\rho} =$
$\rho_{crit} =$
$\frac{1}{6\pi G t^2}.$
A
$B \frac{}{10\frac{r_i}{\delta_i}, B = \frac{9}{20}\frac{t_i}{\delta_i}.}$
$\rho =$
$\frac{M}{\frac{4\pi}{3}r^3} =$
$\frac{3M}{4\pi A^3}(1-$
$\cos\theta)^{-3} because r =$
$A(1-$
$\cos\theta),$
$\bar{\rho} =$
$\frac{1}{6\pi G t^2} =$
$\frac{1}{6\pi G B^2}(\theta -$
$\sin\theta)^{-2} because t =$
$B(\theta -$
$\sin\theta).$
$\delta =$
$\frac{\rho}{\bar{\rho}} =$
$\frac{9}{2}\frac{(\theta - \sin\theta)^2}{(1-\cos\theta)^3}.$
$\rho(t)$
$\rho(\theta)$
$t <<$
t_{ta}
t
θ
$\delta \approx$