where A is a constant and we are keeping only the growing mode. Therefore we have

$$\ln\left(\frac{\phi_2}{\phi_1}\right) \sim m_0\left(t_2 - t_1\right) \tag{4.158}$$

$$\sim m_0 \Delta t \tag{4.159}$$

We know that

$$\phi_1 \sim T \sim m_0 \tag{4.160}$$

and

$$\phi_2 \sim \langle\phi\rangle \tag{4.161}$$

Therefore we have

$$\ln\left(\left[\frac{1}{\sqrt{(2n+4)\,\lambda}}\left(\frac{M_P}{m_0}\right)^n\right]^{\frac{1}{n+1}}\right) \sim m_0 \Delta t \tag{4.162}$$

For all values of n, λ and m_0, we have $\Delta t \geq m_0^{-1}$. Therefore, from Eq. (4.153) we have

$$\zeta \gg \frac{H_{\mathrm{TI}}}{m_0} \tag{4.163}$$

Given that $\zeta \sim 10^{-5}$, we require

$$H_{\mathrm{TI}} \ll 10^{-5} m_0 \tag{4.164}$$