

1129-47-279

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The asymptotic behavior of the effective mass  $m_{\text{eff}}(\Lambda)$  of the so-called Nelson model in quantum field theory is considered, where  $\Lambda$  is an ultraviolet cutoff parameter of the model. Let  $m$  be the bare mass of the model. It is shown that for sufficiently small coupling constant  $|\alpha|$  of the model,  $m_{\text{eff}}(\Lambda)/m$  can be expanded as  $m_{\text{eff}}(\Lambda)/m = 1 + \sum_{n=1}^{\infty} a_n(\Lambda)\alpha^{2n}$ . A physical folklore is that  $a_n(\Lambda) = O([\log \Lambda]^{(n-1)})(\Lambda \rightarrow \infty)$ . It is rigorously shown that

$$0 < \lim_{\Lambda \rightarrow \infty} a_1(\Lambda) < C, \quad C_1 \leq \lim_{\Lambda \rightarrow \infty} a_2(\Lambda)/\log \Lambda \leq C_2$$

with some constants  $C$ ,  $C_1$  and  $C_2$ . (Received March 18, 2017)