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The asymptotic behavior of the so-called effective mass m_{eff} of the Nelson model in the scalar quantum field theory with the space dimension $d \geq 3$ is considered. The Nelson model is defined as a self-adjoint operator by introducing ultraviolet cutoff $\Lambda > 0$. Let $\alpha \in \mathbb{R}$ be a coupling constant. It is shown that for sufficiently small $|\alpha|$,

$$m_{\text{eff}}/m = 1 + \sum_{n=1}^{\infty} a_n(\Lambda)\alpha^{2n},$$

where m denotes a bare mass. It is shown that for $d \leq 2$,

$$\limsup_{\Lambda \rightarrow \infty} |a_n(\Lambda)| < \infty,$$

and for $d = 3$,

$$\lim_{\Lambda \rightarrow \infty} |a_n(\Lambda)|/(\log \Lambda)^{n-1} < \infty$$

holds. (Received September 16, 2014)