Answer: Given: $\dot{x} = Ax + g(x)$, $x(0) = x_0 \in \mathbb{R}^n$ $\quad \frac{\|(g(x))\|}{\|x\|} \to 0$

when $\|x\| \to 0$

we can say, $\|x_0\|$ is sufficiently small.

Apply laplace transformation on $\dot{x} = A(x) + g(x)$

$n(0) = x_0$

$s \cdot x(s) - s(x_0) = Ax(s) + g(s)$

$s(x(s)) - x_0 = A\,x(s) + g(s)$

$s(x(s)) = Ax(s) + g(s) + x_0$

$$x(s) = \frac{g(s) + x_0}{s - A}$$

laplace transformation is as follows:

$F(s) = \int_0^{\infty} f(t)\, e^{-st} \cdot t'$

$\begin{cases} s \to \text{complex number} \\ t \to \text{real number} \geq 0 \\ t' \to \text{first derivative of } f(t) \end{cases}$

$L'(F(s-a)) = e^{at} f(t)$

$\therefore$ By laplace transform:

$x(t) = x_0 \cdot e^{-At} + e^{-At}$

where $t \to \infty$

$x(t) \to 0$

Hence solved!