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In a real Hilbert space H we consider the following singularly perturbed Cauchy problem $\{_{\varepsilon u}'' \varepsilon\delta^{(t)\ +\delta\ u'}\varepsilon\delta^{(t)}$ $^{+Au}\varepsilon\delta(t) + B^{(}u_{\varepsilon\delta}\ (t)^{)} = f(t)$, $t \in (0, T)$, $u_{\varepsilon\delta}(0) = u_0$, $u'\varepsilon\delta^{(0)\ =u}1$, where $u_0, u_1 \in H$, $f: [0, T] \mapsto\rightarrow H$, ε, δ are two small parameters, A is a linear self-adjoint operator and B is a nonlinear $A^{1/2}$ Lipschitzian operator. We study the behavior of solutions $u_{\varepsilon\delta}$ in two different cases: $\varepsilon \rightarrow 0$ and $\delta \geq \delta_0 > 0$; $\varepsilon \rightarrow 0$ and $\delta \rightarrow 0$, relative to solution to the corresponding unperturbed problem. We obtain some a priori estimates of solutions to the perturbed problem, which are uniform with respect to parameters, and a relationship between solutions to both problems. We establish that the solution to the unperturbed problem has a singular behavior, relative to the parameters, in the neighbourhood of $t = 0$.