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In a real Hilbert space H we consider the following singularly perturbed Cauchy problem (Equation presented) where $u_0, u_1 \in H$, $f : [0, T] \rightarrow H$ and ϵ, δ are two small parameters. We study the behavior of the solutions $u_{\epsilon\delta}$ to the problem $(P_{\epsilon\delta})$ in two different cases: (i) when $\epsilon \rightarrow 0$ and $\delta \geq \delta_0 > 0$; (ii) when $\epsilon \rightarrow 0$ and $\delta \rightarrow 0$. We obtain a priori estimates of the solutions to the perturbed problem, which are uniform with respect to the parameters, and a relationship between the solutions to both problems. We establish that the solution to the unperturbed problem has a singular behavior with respect to the parameters in the neighborhood of $t = 0$. We describe the boundary layer and the boundary layer function in both cases.