Troesch's problem is a nonlinear boundary value problem arising in the confinement of a plasma column by radiation pressure, and also in the theory of gas porous electrodes. It is well known that finding numerical solutions to this problem is challenging, especially when the sensitivity parameter is large. In this article, we present an efficient and accurate numerical method for solving Troesch's problem. The method presented in this work is capable of computing the solution, even for extremely high-sensitivity parameter. The method is based on the the Newton–Raphson–Kantorovich approximation method in function space combined with the standard finite difference method. Although, available numerical solvers fail to provide accurate numerical solutions when the sensitivity parameter λ becomes large (λ exceeds 100) [1–5], the method proposed here is able to provide accurate numerical solutions for extremely large values of this sensitivity parameter, up to $\lambda = 500$. Numerical experiments are provided to show the accuracy of the method compared to existing solvers, as well as its capability to compute the solution for high values of the sensitivity parameter λ.