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BOUNDARY-VALUE PROBLEM FOR A SECOND-ORDER NONLINEAR EQUATION WITH DELTA-LIKE POTENTIAL

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A Dirichlet nonlinear problem for a second-order equation is considered on an interval. The problem is perturbed by the delta-like potential $\varepsilon^{-1}Q\left(\varepsilon^{-1}x\right)$, where the function $Q(\xi)$ is compactly supported and $0 < \varepsilon \ll 1$. A solution of this boundary-value problem is constructed with accuracy up to $O(\varepsilon)$ with the use of the method of matched asymptotic expansions. The obtained asymptotic approximation is validated by means of the fixed-point theorem. All types of boundary conditions are considered for a linear boundary-value problem.

Keywords: second-order equation, delta-like potential, small parameter, asymptotics.

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