Existence Results and Numerical Solution for a Fourth Order Elliptic Equation of Kirchhoff Type

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Abstract: In this paper we consider a boundary value problem for a fourth order nonlinear elliptic equation of Kirchhoff type, which describes the nonlinear static deflection of an elastic plate. Differently from other authors, by the reduction of the problem to an operator equation for the nonlinear part of the equation, we have proved the existence and uniqueness of a solution under some easily verified conditions. Also, we propose an iterative method for finding the solution. Some examples demonstrate the applicability of the theoretical results and the efficiency of the iterative method.

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