

The Principle of Minimal Potential Energy of Mixed Variables to Solve the Bending of Cantilever Rectangular Plate under Uniform Load

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ABSTRACT

The bending problem of cantilever rectangular plates has always been a problem for mechanics. Usually, the solution to this kind of problem is solved by numerical calculation methods due to the complexity of its boundary conditions, or it is estimated by the classic energy principle. In this paper, the principle of the minimum potential energy of mixed variables is used to solve the bending problem of a cantilever rectangular plate under uniformly distributed load by assuming the curved surface equation of a rectangular plate through the mixed expression of hyperbolic function and triangular series. The solution process is clear, and the numerical results of MATLAB are compared with the results of ANSYS finite element analysis, which verifies the accuracy of the numerical results. The results show that the principle of mixed variable minimum potential energy is correct to solve the rectangular thin plate bending problem and can be directly applied to practical engineering.