

Nonaxisymmetric unbonded contact of plates on tensionless Winkler foundations

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Mechanics of Structures and Machines 22 (3), pp. 263-281, 1994

Abstract: The unbonded contact problem for an annular plate resting on a tensionless Winkler elastic foundation is investigated. The problem is solved by minimizing the total potential energy of the plate-foundation system. Two alternative functions that include either Bessel or Kelvin functions are used to define the plate displacement. By satisfying a set of four boundary conditions and using the Ritz method, the complete displacement function for the plate is obtained iteratively. To improve the accuracy and convergence of the iterative approach, the solution requires a complete revision of the assumed displacement functions after every iteration. It is proven that the selected displacement functions and the suggested procedure make the approach highly accurate. Comparisons with results obtained by other approaches, in addition to other examples, are presented.