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Using direct method for solving variational problems via triangular orthogonal functions.
(English) Zbl 1193.65196

Summary: This paper establishes a Ritz direct method for solving variational problems via a set of complementary pair of triangular orthogonal functions, derived from well-known block pulse functions. The properties of triangular functions are presented, and the operational matrices for integration, product and some formulas for calculating definite integration of product are derived and utilized to obtain a clear procedure to reduce a variational problem to the solution of algebraic equations. Illustrative examples are included to show the high accuracy of the estimation, and to demonstrate validity and applicability of the method.

MSC:
65N30 Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
49M15 Newton-type methods

Keywords:
variational problems; direct method; triangular functions; operational matrices; orthogonal functions

Full Text: DOI

References:

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