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Polynomial Particular Solutions of Some Elliptic PDE's Using Chebyshev Polynomials.

Using a linear relation between the second order derivative of Chebyshev polynomials and lower order Chebyshev polynomials, we develop a direct matrix method that calculates a particular solution for some inhomogeneous elliptic PDE's. Unlike the previous approaches to finding a particular solution of the PDE's, this new procedure uses the Chebyshev interpolation approximation of the source function directly without the necessity of expanding it in terms of the canonical basis of the polynomial function space. The resulting algebraic system is represented by a triangular. This iterative scheme for efficiently calculating particular solutions can be combined with the method of fundamental solution to solve some boundary value problems in applications. (Received July 21, 2007)