ORTHOGONAL POLYNOMIAL EIGENFUNCTIONS OF SECOND ORDER PARTIAL DIFFERENTIAL EQUATIONS

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Abstract. We show that for most of second order partial differential equations:

\[ L[u] := A(x,y)u_{xx} + 2B(x,y)u_{xy} + C(x,y)u_{yy} + D(x,y)u_x + E(x,y)u_y = \lambda_n u \]

orthogonal polynomial eigenfunctions can be expressed as a product of two classical orthogonal polynomials in one variable. By this way, we can produce more examples of such orthogonal polynomials together with their orthogonalities than the ones found by Krall and Sheffer. Moreover, we can answer to some open questions raised by Krall and Sheffer.

Key words : Orthogonal polynomials in two variables, second order partial differential equations.

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