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Two classes of special functions using Fourier transforms of some finite classes of classical orthogonal polynomials. (English)

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The best-known example of orthogonal system which is mapped onto each other by using the Fourier transform is the system of the Hermite functions, i.e., the Hermite polynomials multiplied by $\exp(-x^2/2)$. In this paper the authors define two specific systems of functions of this type in terms of two finite classes of orthogonal polynomials and, after applying the Fourier transform, they obtain the finite orthogonality relations for the transformed systems. After estimating a complicated integral they also pose a conjecture for a further example of finite orthogonal sequences.

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Keywords : Classical Orthogonal polynomials; Fourier transform; Hypergeometric functions; Gosper identity; Ramanujan integral

Classification :

- ***33C45** Orthogonal polynomials and functions of hypergeometric type
- 33C47** Other special orthogonal polynomials and functions
- 42C05** General theory of orthogonal functions and polynomials
- 33C20** Generalized hypergeometric series
- 33B15** Gamma-functions, etc.
- 42A38** Fourier type transforms, one variable