

# EIGENFUNCTIONS GENERATED BY ODES BELONGING TO THE HEUN CLASS AND THEIR APPLICATIONS IN THE FOURIER ANALYSIS

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The measure distributions are often studied as the basic set of functions in the theory of the Fourier transform. The hypergeometric class of special functions gives a very poor amount of corresponding modelling distributions. A much broader variety of models can be found in the Heun class. The fact that the prolate spheroidal functions are eigenfunctions of the finite Fourier transform is well known and largely exploited. However modified spheroidal functions and double-confluent Heun functions give more sophisticated examples for needs of the Fourier transform.

The asymptotic study of ground eigenfunctions of particular cases of equations belonging to Heun class is given along with the treatise of the corresponding Fourier transform. The advantages and disadvantages of the studied functions comparatively to other functions are discussed.

The physical problem of reconstruction of the structure of thin films is formulated and some examples of its solution in terms of the discussed functions is shown. This inverse ill-posed problem shows robust solution in particular physically adjusted cases.

## References

- [1] Slavyanov S., Lay W., *Special Functions: a Unified Theory Based on Singularities*, 2000, Oxford University Press.