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ON THE CONCENTRATION OF A FUNCTION AND ITS LAGUERRE–BESSEL TRANSFORM

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Abstract. This paper deals with uncertainty principle related to Laguerre-Bessel transform invoking smallness of the support. In particular, we obtain a Benedichs-Amrein-Berthier type theorem related to Laguerre-Bessel transform. As a consequence, we get a global uncertainty inequality and a Heisenberg uncertainty inequality for Laguerre-Bessel transform. Furthermore, invoking essential support, we prove analogous of Donoho-Stark theorem in $L^1(\mathbb{K})$ and $L^2(\mathbb{K})$, where $\mathbb{K} = [0,+\infty) \times [0,+\infty)$.

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REFERENCES

[1] WO. AMREIN AND AM. BERTHIER, *On support properties of L^p-functions and their Fourier transforms*, J. Funct. Anal. **24** (1977), 258–267.
[2] M. BENEDICKS, *On Fourier transforms of functions supported on sets of finite Lebesgue measure*, J. Math. Anal. Appl. **106** (1985), 180–183.
[3] N. BEN SALEM AND S. GHOBBER, *On support properties of functions and their Jacobi transform*, Indian J. Pure Appl. Math. **46** (6) (2015), 879–892.
[4] P. BOGGIATTO, E. CARYPIS AND A. OLIARO, *Two aspects of the Donoho-Stark uncertainty principle*, J. Math. Anal. Appl. **434** (2016), 1489–1503.
[5] D.L. DONOHO AND P.B. STARK, *Uncertainty principles and signal recovery*, SIAM J. Appl. Math. **49** (3) (1989) 906–931.
[6] J. FARAUT AND K. HARZALLAH, *Deux cours d'Analyse Harmonique*, in: Ecole d'été d'Analyse Harmonique de Tunis, Birkhaüser, Boston, 1984.
[7] S. GHOBBER AND P. JAMING, *Uncertainty principles for integral operators*, Stud. Math. **220** (2014) No. 3, 197–220.
[8] S. GHOBBER, *Variations on uncertainty principles for integral operators*, Appl. 93. **220** (2014) , 1057–1072.
[9] S. GHOBBER AND P. JAMING, *Strong annihilating pairs for the Fourier-Bessel transform*, J. Math. Anal. Appl. **377** (2011), 501–515.
[10] S. HAMAM AND L. KAMOUN, *Uncertainty principle inequalities related to Laguerre-Bessel Transform*, Math. Inequal. Appl. **16** (2) (2013), 375–387.
[11] W. HEISENBERG, *Über den anschaulichen inhalt der quantentheoretischen kinematik und machanik*, Z. f. Physik. **43** (1927), 172–198.
[12] E. JEBBARI, M. SIFI AND F. SOLTANI, *Laguerre-Bessel wavelet transform*, Glob. J. Pure Appl. Math. **1** (2005), 13–26.
[13] R.I. JEWETT, *Spaces with an abstract convolution of measures*, Adv. Math., **18** (1975), 1–101.
[14] E. MATUSIAK, M. ZAYDIN AND T. PRZEBINDA, *The Donoho-Stark uncertainty principle for a finite abelian group*, Acta Math. Univ. Comen. New Ser. **73** (2) (2004), 155–160.
[15] F. SOLTANI, *Donoho-Stark uncertainty principle associated with a singular second-order differential operator*, Int. J. Anal. Appl. **4** (2014), 1–10.

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[16] H. WEYL, *Gruppentheorie und Quantenmechanik*, S Hirzel, Leipzig. 1928. Revised English edition: The Theory of Groups and Quantum Mechanics. Methuen London: 1931, reprinted by Dover, New York, 1950.