

The fractional Opdam–Cherednik transform: Theory and application

Ahmed Saoudi⁽¹⁾ and Fida Bahba⁽²⁾

⁽¹⁾ *College of Science, Department of Mathematics, Arar, Saudi Arabia*
e-mail: ahmed.saoudi@ipeim.rnu.tn

⁽²⁾ *Faculty of science of Monastir, Department of Mathematics, Monastir, Tunisia*
e-mail: fidabahba@gmail.com

Abstract

In the present paper, we study a new harmonic analysis in the setting of the Opdam–Cherednik. We establish the fractional Opdam–Cherednik transform in order to generalize the classical fractional Fourier transform. At first, we establish the associated harmonic analysis and we introduce some of its basic properties, such as Parseval identity and inversion formula. Next, we develop the scope of this work by investigating the fractional Opdam–Cherednik transform for transport equation.

Keywords: Fractional Opdam–Cherednik operator, Fractional Opdam–Cherednik transform.

References:

- [1] Almeida, L.B. 1994. The fractional Fourier transform and time-frequency representations. *IEEE Transactions on Signal Processing* 42 (11): 3084–3091.
- [2] Anker, J.-P. 2017. An introduction to Dunkl theory and its analytic aspects. In *Analytic, algebraic and geometric aspects of differential equations*. Bedlewo, Poland, September 6–19, 2015 (pp. 3–58). Birkhäuser/Springer, Cham
- [3] Johansen, T. R. 2015. Remarks on the inverse cherednik-opdam transform on the real line. arXiv preprint arXiv:1502.01293
- [4] Opdam, E.M. 1995. Harmonic analysis for certain representations of graded Hecke algebras. *Acta Mathematica* 175 (1): 75–121.
- [5] Schapira, B. 2008. Contributions to the hypergeometric function theory of Heckman and Opdam: Sharp estimates, Schwartz space, heat kernel. *Geometric and Functional Analysis* 18 (1): 222–250.