

On Sobolev and potential spaces related to Jacobi expansions

Bartosz Langowski

Wrocław University of Technology, Poland
bartosz.langowski@pwr.wroc.pl

Session: 18. Harmonic analysis, orthogonal expansions and Dunkl theory

We define and study Sobolev spaces associated with Jacobi expansions. We prove that these Sobolev spaces are isomorphic, in the Banach space sense, with potential spaces (for the Jacobi ‘Laplacian’) of the same order. This is an essential generalization and strengthening of the recent results [1] concerning the special case of ultraspherical expansions, where in addition a restriction on the parameter of type was imposed. We also present some further results and applications, including a variant of Sobolev embedding theorem. Moreover, we give a characterization of the Jacobi potential spaces of arbitrary order in terms of suitable fractional square functions. As an auxiliary result of independent interest we prove L^p -boundedness of these fractional square functions.

References

- [1] J.J. Betancor, J.C. Fariña, L. Rodríguez-Mesa, R. Testoni, J.L. Torrea, *A choice of Sobolev spaces associated with ultraspherical expansions*, Publ. Math. 54 (2010), 221–242.
- [2] B. Langowski, *Sobolev spaces associated with Jacobi expansions*, preprint (2013). [arXiv:1312.7285](https://arxiv.org/abs/1312.7285)
- [3] B. Langowski, *On potential spaces related to Jacobi expansions*, preprint (2014).