Vector measure orthogonal sequences and signal approximation

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In the last decade we have developed new procedures to construct approximations of functions by defining orthogonal series in spaces of square integrable functions with respect to a vector measure. Sequences of real functions that are orthogonal with respect to a vector measure are a natural generalization of the orthogonal systems with respect to a parametric measure. In this work we present the case when the Fourier coefficients are also functions producing a non linear approximation. We study the convergence properties of these series, defining a convenient approximation structure for signal processing involving parametric dependence of the measure. Some examples regarding classical orthogonal polynomials are given.

Keywords. Function approximation, vector measures, integration.

References

[1] L.M. García Raffi, D. Ginestar and E.A. Sánchez Pérez, *Integration with respect to a vector measure and functions approximation* Abstract and Applied Anal. **19**,10(2000), 207-227.

[2] L.M. García-Raffi, D. Ginestar and E.A. Sánchez Pérez, *Vector measure orthonormal systems and self-weighted functions approximation.* Publications of RIMS. **41**,3(2005), 551-563.

[3] L. M. García Raffi, E. A. Sánchez Pérez and J. V. Sánchez Pérez, *Commutative sequences of integrable functions and best approximation with respect to the weighted vector measure distance*, Inte. Eq. Op. Th., **54**(2006), 495-510.

[4] D.R. Lewis, *Integration with respect to vector measures*, Pacific J. Math. **33**(1970), 157-165.

[5] J. Lindenstrauss and L. Tzafriri, *Classical Banach Spaces II*, Springer-Verlag, Berlin, 1979.

[6] S. Okada, W.J. Ricker and E.A. Sánchez Pérez, *Optimal domain and integral extension of operators acting in function spaces.* Operator Theory: Advances and Applications, **180**. Birkhäuser Verlag, Basel, 2008.

[7] E.A. Sánchez Pérez, *Vector measure orthonormal functions and best approximation for the 4-norm.* Arch. Math. **80**(2003), 177-190.

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