Variation diminishing type estimates for generalized sampling operators and applications

Laura Angeloni
Department of Mathematics and Computer Science, University of Perugia
laura.angeloni@unipg.it
Danilo Costarelli
Department of Mathematics and Computer Science, University of Perugia
danilo.costarelli@unipg.it
Gianluca Vinti
Department of Mathematics and Computer Science, University of Perugia
gianluca.vinti@unipg.it

The variation diminishing estimate is a classical result that is usually investigated working in BV spaces with some classes of operators: such result essentially ensures that the variation of the operator is not bigger than the variation of the function to which it is applied. We will present estimates of this kind, besides results about convergence in variation, for multivariate sampling-type operators. Differently from the one-dimensional frame, where variation diminishing type results are usually quite easy to be achieved, the multidimensional case is more delicate: nevertheless it is interesting, also from an applicative point of view, since it is connected to some problems of Digital Image Processing, in particular to smoothing procedures.

References

[1] L. Angeloni, G. Vinti, *Estimates in variation for multivariate sampling-type operators*, Dolomites Research Notes on Approximation, **14**(2) (2021), 1–9.

[2] L. Angeloni, D. Costarelli, G. Vinti, *A characterization of the convergence in variation for the generalized sampling series*, Ann. Acad. Sci. Fenn. Math., **43** (2018), 755–767.

[3] L. Angeloni, D. Costarelli, G. Vinti, *Convergence in variation for the multidimensional generalized sampling series and applications to smoothing for digital image processing*, Ann. Acad. Sci. Fenn. Math., **45** (2020), 751–770.

[4] L. Angeloni, D. Costarelli, M. Seracini, G. Vinti, L. Zampogni, *Variation*

diminishing-type properties for multivariate sampling Kantorovich operators, Boll. Unione Mat. Ital., Special Issue "Measure, Integration and Applications" dedicated to Prof. Domenico Candeloro, **13** (2020), 595–605.

[5] P.L. Butzer, A. Fisher, R.L. Stens, *Generalized sampling approximation of multivariate signals: theory and applications*, Note Mat., **1** (10), 173–191 (1990).

[6] C. Bardaro, P.L. Butzer, R.L. Stens, G. Vinti, *Prediction by Samples From the Past With Error Estimates Covering Discontinuous Signals*, IEEE Trans. Inform. Theory, **56** (1), 614–633 (2010).