A STRENGTHENED CAUCHY—SCHWARZ
INEQUALITY FOR BIORTHOGONAL WAVELETS

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Abstract. A strengthened Cauchy–Schwarz inequality for spaces of biorthogonal wavelets defined on the real line and on the interval is proved. The strengthened Cauchy–Schwarz inequality is a fundamental tool in the analysis of the multilevel methods and, in particular, plays an important role in the a posteriori error estimates for hierarchical methods.

REFERENCES

[AHJP]   L. ANDERSON, N. HALL, B. JAWERTH, G. PETERS, *Wavelets on closed subsets of the real line*, in *Recent advances in wavelet analysis*, L.L.Schumaker, G.Webb (eds.), Academic Press, 1991, 1–61.

[BB]   R. E. BANK, M. BENBOURENANE, *The hierarchical basis multigrid method for convection-diffusion equations*, Numer. Math., **61** (1992), 7–37.

[BDY]   R. E. BANK, T. F. DUPONT, H. YSERENTANT, *The hierarchical basis multigrid method*, Numer. Math., **52** (1988), 427–458.

[BS]   R. E. BANK, R. K. SMITH, *A posteriori error estimates based on hierarchical bases*, SIAM J. Numer. Anal., **30** (1993), 921–935.

[CC]   C. CANUTO, I. CRAVERO, *A wavelet–based adaptive finite element method for advection–diffusion equations*, M^3AS, **7** (1997), 265–289.

[CT]   C. CANUTO, A. TABACCO, *Multilevel decompositions of functional spaces*, J. Fourier Anal. and Appl., **3** (1997), 715–742.

[C]   C. K. CHUI, *An introduction to wavelets*, Academic Press, San Diego, 1992.

[CDF]   A. COHEN, I. DAUBECHIES, J. C. FEAUVEAU, *Biorthogonal bases of compactly supported wavelets*, Comm. Pure Appl. Math., **XLV** (1992), 485–560.

[CDV]   A. COHEN, I. DAUBECHIES, P. VIAL, *Wavelets on the interval and fast wavelet transform*, AT & T Bell Laboratories, preprint (1992).

[CDJV]   A. COHEN, I. DAUBECHIES, B. JAWERTH, P. VIAL, *Multiresolution analysis, wavelets and fast algorithms on an interval*, C. R. Acad. Sci. Paris, **316** (1993), 417–421.

[Dah]   W. DAHMEN, *Multiscale analysis, approximation, and interpolation space*, in *Approximation Theory VIII*, C. K. Chui, L. L. Schumaker (eds.), (1995), 1–41.

[DKU]   W. DAHMEN, A. KUNOTH, K. URBAN, *Biorthogonal Spline Wavelets on the Interval – Stability and Moment Conditions*, RWTH Aachen, 1996.

[Dau]   I. DAUBECHIES, *Ten lectures on wavelets*, CBMS–NSF Series in Applied Mathematics 61, SIAM, Philadelphia, 1992.

[De1]   A. DE ROSSI, *Tesi di Dottorato*, Università di Milano (1997).

[De2]   A. DE ROSSI, *A posteriori error estimates for hierarchical methods*, preprint, Università di Torino, **3** (1997).

[EV]   V. EIJKHOUT, P. VASSILEVSKI, *The role of the strengthened Cauchy-Buniakowskii-Schwarz inequality in multilevel methods*, SIAM Review, **33** (1991), 405–419.

[MT]   M. MARION, R. TEMAM, *Nonlinear Galerkin methods: the finite elements case*, *Numer. Math.*, **57** (1990), 205–226.

[M]   Y. MEYER, *Ondelettes et operatéurs I*, Hermann, Paris, 1990.

[Y]   H. YSERENTANT, *On the multi-level splitting of finite element spaces*, *Numer. Math.*, **49** (1986), 379–412.

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Paper MIA-02-24

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