

## Peter Oswald: Publication List (October 2009)

### Publications in refereed journals

1. P. Oswald, On moduli of continuity for equimeasurable functions in the classes  $\phi(L)$ . *Mat. Zametki* 17, 2 (1975), 231–244 (in Russian).
2. E. A. Storozhenko, V. G. Krotov, P. Oswald, Direct and inverse theorems of Jackson type in the spaces  $L_p$ ,  $0 < p < 1$ . *Mat. Sbornik* 98, 3 (1975), 395–415. (in Russian).
3. V. G. Krotov, P. Oswald, E. A. Storozhenko, Direct and inverse theorems of Jackson type in the spaces  $L_p$ ,  $0 < p < 1$ . *Doklady Akad. Nauk SSSR* 226, 1 (1976), 44–47 (in Russian).
4. E. A. Storozhenko, P. Oswald, A theorem of Jackson type in the spaces  $L_p(R^k)$ ,  $0 < p < 1$ . *Doklady Akad. Nauk SSSR* 229, 3 (1976), 554–557 (in Russian).
5. P. Oswald, Some inequalities for trigonometric polynomials in the metric  $L_p$ ,  $0 < p < 1$ . *Izv. Vusov Matematika* 7 (1976), 65–75 (in Russian).
6. E. A. Storozhenko, P. Oswald, Moduli of smoothness and best approximation in the spaces  $L_p$ ,  $0 < p < 1$ . *Analysis Math.* 3, 2 (1977), 141–150.
7. P. Oswald, On the  $C$  norm of orthoprojections onto subspaces of polygons. *Matem. Zametki* 21, 4 (1977), 495–502 (in Russian).
8. E. A. Storozhenko, P. Oswald, Theorem of Jackson in the spaces  $L_p(R^k)$ ,  $0 < p < 1$ . *Sibir. Mat. Zhurnal* 19, 4 (1978), 888–901 (in Russian).
9. P. Oswald, Ungleichungen vom Jackson-Typ für die algebraische beste Approximation in  $L_p$ . *J. Approx. Th.* 23, 2 (1978), 113–137.
10. P. Oswald, Spline approximation in the metric  $L_p$ ,  $0 < p < 1$ . *Math. Nachrichten* 94 (1980), 69–96 (in Russian).
11. P. Oswald, On a connectedness property of the complements of zero-neighbourhoods in topological vector spaces. *Comm. Math. Univ. Carol.* 22, 2 (1981), 351–356.
12. P. Oswald,  $L_p$ -Approximation durch Reihen nach dem Haar-Orthogonal-System und dem Faber-Schauder-System. *J. Approx. Th.* 33, 1 (1981), 1–27.
13. P. Oswald, Fourier series and conjugate function in  $\phi(L)$ . *Analysis Math.* 8, 4 (1982), 287–303.
14. P. Oswald, On spline bases in periodic Hardy spaces ( $0 < p \leq 1$ ). *Math. Nachrichten* 108 (1982), 219–229.

15. P. Oswald, On Schauder bases in Hardy spaces. *Proc. Roy. Soc. Edinb. Ser. A* 93 (1983), 259–263.
16. P. Oswald, On Besov Hardy Sobolev spaces of analytic functions in the unit disc. *Czech. Math. J.* 33 (108) (1983), 408–426.
17. P. Oswald, On some convergence properties of Haar-Fourier series in the classes  $\phi(L)$ . *Acta Math. Acad. Sci. Hung.* 42, 3-4 (1983), 279–293.
18. P. Oswald, On the approximation rate of Vallee-Poussin means of trigonometric series in the metric  $L_p$ ,  $0 < p < 1$ . *Izv. Akad. Nauk Arm. SSR Ser. mat.* 18, 3 (1983), 230–245 (in Russian).
19. P. Oswald, On Marcinkiewicz means of double Fourier integrals in  $H_p$  ( $p < 1$ ). *Vestnik Mosk. Univ. Ser. mech. mat.* 6 (1983), 56–63 (in Russian).
20. P. Oswald, On some approximation properties in real Hardy spaces ( $0 < p < 1$ ). *J. Approx. Th.* 40, 1 (1984), 45–65.
21. P. Oswald, Spline approximation in  $H_p(T)$ ,  $p < 1$ . *Studia Math.* 81 (1985), 13–28.
22. P. Oswald, On apriori estimates for positive solutions of a semilinear biharmonic equation in a ball. *Comm. Math. Univ. Carol.* 26, 3 (1985), 565–577.
23. P. Oswald, On Marcinkiewicz-Riesz summability of Fourier integrals in Hardy spaces. *Math. Nachrichten* 133 (1987), 173–187.
24. P. Oswald, On function spaces related to finite element approximation theory. *Z. Anal. Anwendungen* 9, 1 (1990), 43–64.
25. P. Oswald, On the degree of nonlinear spline approximation in Besov-Sobolev spaces. *J. Approx. Th.* 61, 2 (1990), 131–157.
26. P. Oswald, Hierarchical conforming finite element methods for the biharmonic equation. *SIAM J. Numer. Anal.* 29 (1992), 1610–1625.
27. P. Oswald, On a hierarchical basis multilevel method with nonconforming P1 elements. *Numer. Math.* 62 (1992), 189–212.
28. P. Oswald, On the boundedness of the mapping  $f \rightarrow |f|$  in Besov spaces. *Comm. Math. Univ. Carolinae* 33 (1992), 57–66.
29. P. Oswald, On a BPX preconditioner for P1-elements. *Computing* 51 (1993), 125–133.
30. M. Griebel, P. Oswald, On additive Schwarz preconditioners for sparse grid discretizations. *Numer. Math.* 66 (1993), 449–463.
31. W. Dahmen, P. Oswald, X.-Q. Shi,  $C^1$ -hierarchical bases. *J. Comput.*

- Appl. Math.* 51, 1 (1994), 37–56.
32. P. Oswald, On the convergence rate of SOR: A worst case estimate. *Computing* 52 (1994), 245–255.
33. W. I. Filippov, P. Oswald, Representation in  $L_p$  by series of translates and dilates of one function. *J. Approx. Th.* 82 (1995), 15–29.
34. M. Griebel, P. Oswald, Remarks on the abstract theory of additive and multiplicative Schwarz methods. *Numer. Math.* 70 (1995), 163–180.
35. M. Griebel, P. Oswald, Tensor-product-type subspace splittings and multilevel iterative methods for anisotropic problems. *Adv. Comput. Math.* 4 (1995), 171–206.
36. P. Oswald, Multilevel preconditioners for discretizations of the biharmonic equation by rectangular finite elements. *J. Numer. Lin. Alg. Appl.* 2 (1995), 487–505.
37. P. Oswald, Preconditioners for nonconforming elements. *Math. Comp.* 65 (1996), 923–941.
38. P. Oswald, Intergrid transfer operators and multilevel preconditioners for nonconforming discretizations. *Appl. Numer. Math.* 13 (1997), 139–158.
39. P. Oswald, An optimal multilevel preconditioner for solenoidal approximations of the 2D Stokes problem. *IMA J. Numer. Anal.* 14 (1997), 1–22.
40. Z. Chen, P. Oswald, Multigrid and multilevel methods for nonconforming rotated Q1 elements. *Math. Comp.* 67 (1998), 667–693.
41. P. Oswald, Multilevel norms for  $H^{-1/2}$ . *Computing* 61 (1998), 235–255.
42. P. Oswald, On the robustness of the BPX-preconditioner with respect to jumps in the coefficients. *Math. Comp.* 68 (1999), 633–650.
43. M. Griebel, P. Oswald, T. Schiekofer, Sparse grids for boundary integral equations. *Numer. Math.* 83 (1999), 279–312.
44. R. Lorentz, P. Oswald, Criteria for hierarchical bases in Sobolev spaces. *Appl. Comput. Harmon. Anal.* 8 (2000), 32–85.
45. P. Oswald, Greedy algorithms and best  $m$ -term approximation with respect to biorthogonal systems. *J. Fourier Anal. Appl.* 7, 2001, 325–341.
46. P. Oswald, Remarks on multilevel-bases for divergence-free elements. *Numer. Algorithms* 27, 2001, 131–152.
47. P. Oswald, M. A. Shokrollahi, Capacity-achieving sequences for the erasure channel. *IEEE Trans. on Information Theory* 48, 12, 2002, 3017–3028.

48. Q. Jiang, P. Oswald, Triangular  $\sqrt{3}$ -subdivision schemes: the regular case. *J. Comput. Appl. Math.* 156, 2003, 47–75.
49. Q. Jiang, P. Oswald, S. Riemenschneider,  $\sqrt{3}$ -subdivision schemes: maximal sum rule orders. *Constr. Approx.* 19, 3, 2003, 437–463.
50. P. Oswald, P. Schröder, Composite primal/dual  $\sqrt{3}$ -subdivision schemes. *CAGD* 20, 3, 2003, 135–164.
51. P. Oswald, Smoothness of nonlinear median-interpolation subdivision. *Adv. Comput. Math.* 20, 2004, 401–423.
52. C. K. Madsen, P. Oswald, Optical filter architecture for approximating any  $2 \times 2$  unitary matrix. *Optics Letters* 28, 7, 2003, 534–536.
53. P. Oswald, C. K. Madsen, R. L. Konsbruck, Analysis of scalable PMD compensators using FIR filters and wavelength-dependent optical power measurements. *J. Lightwave Technol.* 22, 2, 2004, 647–657.
54. C. K. Madsen, P. Oswald, M. Capuzzo, E. Chen, L. Gomez, A. Griffin, A. Kasper, E. Laskowski, L. Stulz, A. Wong-Foy, Reset-free integrated polarization controller using phase shifters. *IEEE J. Sel. Topics in Quantum Electronics* 11, 2, 2005, 431–438.
55. P. Oswald, Designing composite triangular subdivision schemes, *CAGD* 22, 2005, 659–679.
56. P. Oswald, C. K. Madsen, Deterministic analysis of endless tuning of polarization controllers. *J. Lightwave Technol.* 24, 7, 2006, 2932–2939.
57. P. Oswald, A counterexample for the  $L_2$ -projector onto linear spline spaces. *Math. Comp.* 77, 2008, 221–226.
58. P. Oswald, T. Shingel, Splitting methods for  $SU(N)$  loop approximation. *J. Approx. Th.* 161(1), 2009, 174–186. doi:10.1016/j.jat.2008.08.018
59. P. Oswald, Optimality of multilevel preconditioning for nonconforming  $P_1$  finite elements. *Numer. Mathematik* 111, 2008, 267–291.
60. J. Maes, P. Oswald, Multilevel finite element preconditioning for  $\sqrt{3}$  refinement. *Mathematics of Computation* 78, 268, 2009, 1869–1890.

### Submitted/accepted publications

(accessible from <http://www.faculty.jacobs-university.de/poswald/>)

61. S. Harizanov, P. Oswald, Stability of nonlinear subdivision and multiscale transforms. *Constr. Approx.* (submitted May 2008, accepted May 2009).
62. P. Oswald, T. Shingel, Close-to-optimal bounds for  $SU(N)$  loop approx-

imation. *J. Approx. Th.* (submitted August 2008).

63. S. Harizanov, P. Oswald, T. Shingel, Normal Multi-Scale Transforms for Curves, *Found. Comput. Mathematics* (submitted September 2009).

## Monographs, Collections, Surveys

1. P. Oswald, *Multilevel finite element approximation: theory & applications*. Teubner Skripte zur Numerik, Teubner, Stuttgart, 1994.

2. *Multiscale Wavelet Methods for Partial Differential Equations* (W. Dahmen, A. J. Kurdila, P. Oswald, eds.) Wavelet Analysis and Its Applications, vol. 6, Academic Press, San Diego, 1997.

3. P. Oswald, Multilevel solvers for elliptic boundary value problems on domains. In *Multiscale Wavelet Methods for PDEs* (W. Dahmen, A. J. Kurdila, P. Oswald, eds.), Wavelet Analysis and Its Applications, vol. 6, Academic Press, San Diego, 1997, pp. 3–58.

4. J. Ko, A. J. Kurdila, P. Oswald, Scaling function and wavelet preconditioners for second order elliptic problems, In *Multiscale Wavelet Methods for PDEs* (W. Dahmen, A. J. Kurdila, P. Oswald, eds.), Wavelet Analysis and Its Applications, vol. 6, Academic Press, San Diego, 1997, pp. 413–438.

5. P. Oswald, Subspace correction methods and multigrid theory. Guest contribution in: U. Trottenberg, C. W. Oosterlee, A. Schüller, *Multigrid*, Acad. Press, San Diego, 2001, pp. 533–572.

6. N. Dyn, P. Oswald, Univariate subdivision and multiscale transforms: The nonlinear case. In *Multiscale, Nonlinear, and Adaptive Approximation* (R. A. DeVore, A. Kunoth eds.), Springer, Berlin, 2009, pp. 203–247.

## Publications in refereed books and proceedings

1. P. Oswald, On algebraic approximation to functions in  $L_p$ . In *Conf. on Function Theory, Baku 1977*, Izd. Azerb. Univ. Baku, 1980, 207–211 (in Russian).

2. P. Oswald, Über Einbettungssätze für Funktionen aus  $\Phi(L)$ . *Wiss. Z. TU Dresden* 29, 6 (1980), 1311–1315.

3. P. Oswald, Über die Konvergenz von Orthogonalreihen in  $\Phi(L)$ . *Wiss. Z. TU Dresden* 30, 4 (1981), 117–119.

4. P. Oswald, On inequalities for spline approximation and spline systems in the spaces  $L_p$ ,  $0 < p < 1$ . In *Proc. Int. Conf. Approximation and Function Spaces, Gdansk 1979*, PWN, Warsaw, 1981, 531–552.

5. P. Oswald, On coefficient properties of power series. In *Proc. Int. Conf.*

*Constructive Function Theory, Varna 1981*, Izd. Bulg. Akad. Nauk., Sofia, 1983, 468–474.

6. R. Fritzsche, P. Oswald, Zur optimalen Gitterwahl bei Finite Elemente Approximationen. *Wiss. Z. TU Dresden* 37, 3 (1988), 155–158.

7. G. Geymonat, P. Oswald, Some remarks on the approximation by finite element methods. In *Approximation and Function Spaces*, Banach Center Publ. 22 PWN, Warsaw, 1989, 137–164.

8. P. Oswald, On estimates for one-dimensional spline approximation. In *Splines in Numerical Analysis, Proc. ISAM'89 Weissig* (J. Späth, J.W. Schmidt, eds.), Akademie-Verl., Berlin, 1989, 111–124.

9. P. Oswald, On discrete norm estimates related to multilevel preconditioners in the finite element method. In *Constructive Theory of Functions, Varna 1991* (K.G. Ivanov, P. Petrushev, B. Sendov, eds.), Bulg. Acad. Sci., Sofia, 1992, 203–214.

10. P. Oswald, Stable subspace splittings for Sobolev spaces and some domain decomposition algorithms. In *Proc. 7th Symp. on Domain Decomposition Methods, Penn State Univ. 1993* (D. Keyes, J. Xu, eds.), Contemporary Math. vol. 180, AMS, Providence, 1994, 87–96.

11. U. Kotycka, P. Oswald, Piecewise linear prewavelets of small support. In *Approximation Theory VIII* (Ch.K. Chui, L.L. Schumaker, eds.), World Sci. Publ., Singapore, 1995, 235–242.

12. R. Lorentz, P. Oswald, Multilevel finite element Riesz bases in Sobolev spaces. In *Proc. 9th Int. Conf. on Domain Decomposition Methods in Science and Engineering* (P. Bjorstad et al., eds.), Domain Decomposition Press, Bergen, 1998, 178–187.

13. R. Lorentz, P. Oswald, Nonexistence of compactly supported box spline prewavelets in Sobolev spaces. In *Curves and Surfaces, Chamonia 1996* (A. Le Mehaute, C. Rabut, L.L. Schumaker, eds.), Vanderbilt Univ. Press, Nashville, 1997, 275–283.

14. P. Oswald, Multigrid prolongations and matrix subdivision. In *Approximation Theory IX, vol. 2* (C.K. Chui, L.L. Schumaker, eds.), Vanderbilt Univ. Press., Nashville, 1998, 275–283.

15. P. Oswald, Best  $N$ -term approximation by Haar functions in  $H^s$ -norms. In *Metric Function Theory and Related Topics in Analysis* (S.M. Nikol'skij, B.S. Kashin, A.D. Izaak, eds.), AFC, Moscow, 1999, 137–163 (in Russian).

16. P. Oswald, Interface preconditioners and multilevel extension operators. In *Proc. 11th Int. Conf. on Domain Decomposition Methods in Science and*

- Engineering, London 1998* (C.-H. Lai et al., eds.), ddm.org, 1999, 96–103.
17. P. Oswald, Best  $N$ -term capacitance approximation on sparse grids. In *12th Intern. Conf. on Domain Decomposition Methods in Science and Engineering* (T. Chan et al., eds.), ddm.org, 2001, pp. 437–444.
  18. P. Oswald, B. Wohlmuth, On polynomial reproduction of dual FE bases. In *13th Intern. Conf. on Domain Decomposition Methods in Science and Engineering* (N. Debit et al., eds.), ddm.org, 2001, pp. 85–96.
  19. P. Oswald, Extremal properties of trigonometric polynomials with applications to signal design. In *Int. Conf. Trends in Approximation Theory*, K. Kopotun, T. Lyche, M. Neamtu, eds.), Vanderbilt Univ. Press, Nashville, 2001, pp. 343–352.
  20. P. Oswald, Smoothness of a nonlinear subdivision scheme. In *Curves and Surface Fitting: Saint-Malo 2002*, A. Cohen, J.-L. Merrien, L. L. Schumaker (eds.), Nashboro Press, Brentwood, 2003, pp. 323–332.
  21. M. Griebel, P. Oswald, M. A. Schweitzer, A particle-partition of unity method-Part VI: A  $p$ -robust multilevel solver. In *Meshfree Methods for Partial Differential Equations II* (M. Griebel and M. A. Schweitzer, editors), LNCS, vol. 43, Springer, 2005, pp. 71–92.
  22. P. Oswald, Semiorthogonal linear prewavelets on irregular meshes. In *Approximation and Probability*, Banach Center Publ. vol. 72, Inst. Math. Polish Acad. Sci., 2006, 221–234.
  23. P. Oswald, Stable space splittings and fusion frames. In *Wavelets XIII* (V.K. Goyal, M. Papadakis, D. Van de Ville, eds.), Proc. SPIE Vol. 7446 (SPIE, Bellingham, 2009), 744611. doi:10.117/12.825303

## **Dissertations, further writing**

1. P. Oswald, Moduli of smoothness of equimeasurable functions and approximation by algebraic polynomials in  $L_p$ . Dissertation A (PhD Thesis). Moscow Institute of Electrical Engineering, Faculty of Mathematics, 1978 (in Russian).
2. P. Oswald,  $L_p$ -Splineapproximation ( $0 < p < 1$ ), Splinesysteme und Funktionenräume vom Besov-Hardy-Sobolev-Typ. Dissertation B (Habilitation), Friedrich-Schiller-Universität Jena, Sektion Mathematik, 1982.
3. P. Oswald, Convergence of spline expansions in Hardy spaces ( $0 < p \leq 1$ ). Preprint 07-03-81, Sekt. Mathematik, TU Dresden, 1981.
4. P. Oswald, On estimates for hierarchic basis representations of finite element functions. Forsch.-Erg. N/89/16, FSU Jena, 1989.

5. P. Oswald, On  $C^1$ -interpolating hierarchical spline bases. Forsch.-Erg. N/89/19, FSU Jena, 1989.
6. P. Oswald, Two remarks on multilevel preconditioners. Forsch.-Erg. FSU Jena, Math-1-91, 1991.
7. P. Oswald, Norm equivalencies and multilevel Schwarz preconditioning for variational problems, Forsch.-Erg. FSU Jena, Math-1-92, 1992.
8. P. Oswald, Stable splittings of Sobolev spaces and fast solution of variational problems. Forsch.-Erg. FSU Jena, Math-5-92, 1992.
9. P. Oswald, Stable subspace splittings of Sobolev spaces and their applications. Forsch.-Erg. FSU Jena, Math-4-93, 1993.
10. R. Lorentz, P. Oswald, Constructing economical Riesz bases for Sobolev spaces. GMD-Arbeitsbericht 993, Sankt Augustin, May 1996.
11. P. Oswald, On norm bounds for iterated intergrid transfer operators. GMD-Arbeitsbericht 1079, Sankt Augustin, June 1997.
12. P. Oswald, Frames and space splittings in Hilbert spaces. Lecture notes (Part 1), Bell Laboratories, September 1997.
13. P. Oswald, Multilevel frames and Riesz bases in Sobolev spaces. Lecture notes (Part 2), Bell Laboratories, June 1998.
14. P. Oswald, Some nonlinear approximation problems related to spherical codes and  $n$ -widths. Bell Laboratories, November 1998.
15. P. Oswald, On codes for multiple antenna differential modulation. Bell Laboratories, April 1999.
16. P. Oswald, Unitary M-antenna constellations and spherical codes. Bell Laboratories, January 2000.
17. P. Oswald, Nonlinear multiresolution analysis, *Oberwolfach Rep.* 36-2007, 39–42.
18. P. Oswald, Proving  $H^{1+\alpha}$  Bernstein inequalities for nonnested multilevel spaces. *Oberwolfach Rep.* 23-2008, 40–41.