НЯКОИ ПО-СЪЩЕСТВЕНИ ЦИТИРАНИЯ

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- **S. Margenov, Upper bound of the constant in the strengthened C.B.S. inequality for FEM 2D elasticity equations, Numerical Linear Algebra with Applications, Vol. 1(1) (1994), 65 – 74**

  In:

1. P.S. Vassilevski, On two ways of stabilizing the hierarchical basis multilevel methods, SIAM Review, 39 (1997), 18-53

   "Explicit expressions and/or numerical estimates of γ_T are derived in … Margenov [25], Margenov, Xanthis and Zikatanov [27] … for various finite elements and bilinear forms"

- ***S. Margenov, P.S. Vassilevski, Algebraic multilevel preconditioning of anisotropic elliptic problems, SIAM J. Sci. Comp., V.15(5) (1994), 1026-1037***

In:

2. *Z. Chen, R.E. Ewing, R.D. Lazarov, S. Maliassov, Y. A. Kuznetsov, Multilevel preconditioners for mixed methods for second order elliptic problems, Numerical Linear Algebra with Applications, Vol. 3 (5) (1996), 427-454*

   "*In the last steps we use an algebraic multigrid method [4, 21, **25**, 36] to solve this 7-point problem. It is shown that the application of such solvers for the problems on the coarse level gives the preconditioner with an optimal complexity. Explicit estimates of condition numbers are also obtained for these multilevel preconditioners."*

- **Lirkov, S. Margenov, On circulant preconditioning of elliptic problems in L-shaped domains, in Advances in Numerical Methods and Applications, in: I. Dimov, Bl. Sendov, P.S. Vassilevski eds., World Scientific (1994), 136-145**

  In:

3. R. H. Chan, M. K. Ng, Conjugate Gradient Methods for Toeplitz Systems, SIAM Review, Vol. 38 (3) (1996), 427-482

   "For rectangular regions, the condition number of the preconditioned system P-1A is proven to be of O (1). In contrast, the system preconditioned by the MILU, MINV, and optimal circulant preconditioners is of O (n). We remark that a similar construction of optimal circulant approximations on L-shaped domains has recently been considered by Lirkov and Margenov [38]."

- **Lirkov, S. Margenov, P.S. Vassilevski, Circulant block-factorization preconditioners for elliptic problems, Computing, Vol.53(1) (1994), 59-74**

  <u>In</u>:

4. S. Serra Capizzano, Locally X matrices, spectral distributions, preconditioning, and applications, SIAM Journal on Matrix Analysis and Applications, Vol. 21 (4) (2000), 1354-138

   *"The PCG methods based on preconditioners from incomplete LU factorizations [22, 8, 16] and from the circulant algebra [6, 19, **21**] are sublinear, i.e., require a number of iterations O(n). This is true even in the case (a.1), where a is positive and smooth."*

- **Lirkov, S. Margenov, L. Zikatanov, Circulant block-factorization preconditioning of anisotropic problems, Computing, Vol. 58(3) (1997), 245-258**

  <u>In</u>:

5. S. Friedhoff, S. Mac Lachlan, A generalized predictive analysis tool for multigrid methods, Numerical Linear Algebra with Applications, Vol. 22 (4) (2015), 618–647

   *"The use of circulant or block-circulant-structured preconditioners for non-circulant problems has a long history [51, **52**], but is primarily focused on the case of problems that retain elliptic character; here, we consider the space-time discretization of parabolic problems, for which simple (multilevel) circulant preconditioners do not yield good performance."*

- **S. Margenov, P.S. Vassilevski, Algebraic multilevel preconditioning of anisotropic elliptic problems, SIAM J. Sci. Comp., V.15(5) (1994), 1026-1037**

  <u>In</u>:

6. O. Axelsson, A. Padiy, On the additive version of the Algebraic Multilevel Iteration Method for anisotropic elliptic problems, SIAM Journal on Scientific Computing, 20 (5) (1999), 1807-1830

   "Handling problems with irregularity of the discretization meshes, anisotropy, and discontinuity of the coefficient function in the problem are challenges for iterative solution methods. Many efforts have been devoted to the construction of efficient and robust techniques able to overcome some of those difficulties (see [4], [17], [19], [22], for instance), but there is still no common solution to all arising questions."

- **S. Margenov, L. Xanthis, L. Zikatanov, On the optimality of the semicoarsening AMLI algorithm, in Iterative Methods in Linear Algebra, II, IMACS Series in Computational and Applied Mathematics, New Jersey, USA,Vol.3 (1996), 270-279**

  <u>In</u>:

7. Y.A. Erlangga, R. Nabben, Algebraic Multilevel Krylov Methods, SIAM Journal on Scientific Computing, Vol. 31 (5) (2009), 3417-3437

   *"In contrast to geometric MG methods, AMG does not basically need an a priori grid hierarchy. Instead, the coarse-grid system is determined by dividing the set of unknowns (also called nodes) into two disjoint sets: the fine (F) and coarse (C) unknowns, based on the representation of matrices in graphs and a suitable algebraic smoothness condition. Examples of techniques to define the F and C unknowns include the nearest neighborhood coupling or aggregation [28, **19**, 5, 34, 25]."*

- **R.D. Lazarov, S.D. Margenov, CBS constants for multilevel splitting of graph-Laplacian and application to preconditioning of discontinuous Galerkin systems, Journal of Complexity, 23 (2007), 498-515**

  In:

8. M. Dryja, J. Galvis, M. Sarkis, A FETI-DP Preconditioner for a Composite Finite Element and Discontinuous Galerkin Method, SIAM Journal on Numerical Analysis, 51(1) (2013), 400-422, ISSN: 0036-1429

   *"We note that other types of preconditioners have been considered for solving DG discretizations. In connection with block diagonal overlapping Schwarz methods, see, for example, [17, 18, 27, 8, 1, 2, 10, 29, 5] while or multilevel preconditioners see [19, 22, **28**, 26, 25, 6]."*

- **J. Kraus, S. Margenov, Robust Algebraic Multilevel Methods and Algorithms, Radon Series on Computational and Applied Mathematics, 5, de Gruyter, 2009**

  In:

9. J. Willems, Robust multilevel methods for general symmetric positive definite operators, SIAM Journal on Numerical Analysis, 52(1) (2014), 103–124

   *"In the present work we, therefore, consider a generalization of the abstract method in [7] to multiple levels. We do so by using the framework of (nonlinear) algebraic multilevel iterations (AMLI) (see, e.g., [2, 14, 15, **16**, 27] and the references therein)."*

- **P. Popov, Y. Vutov, S. Margenov and O. Iliev, Finite Volume Discretization of Equations Describing Nonlinear Diffusion in Li-Ion Batteries, Numerical Methods and Applications, Lecture Notes in Computer Science, Vol. 6046 (2011), 338-346**

  In:

10. O. Lass, S. Volkwein, POD Galerkin schemes for nonlinear elliptic-parabolic systems, SIAM Journal on Scientific Computing, 35(3) (2013), A1271–A1298, ISSN:1064-8275

    *"In the present paper we consider an elliptic-parabolic PDE system consisting of two elliptic equations and one parabolic equation. These coupled system can be viewed as a generalization of a mathematical model for lithium ion batteries; see, e.g., [12, **25**, 30]. The parabolic equation describes the concentration of lithium ions, and the two elliptic PDEs model the potential in the solid and liquid phases, respectively. These equations are coupled by a strong nonlinearity, which is a catenation of the square root, the hyperbolic sine, and the logarithmic functions."*

- **Y. Efendiev, J. Galvis, R.D. Lazarov, S. Margenov, and J. Ren, Robust two-level domain decomposition preconditioners for high-contrast anisotropic flows in multiscale media, Comp. Meth. Appl. Math., 12 (4) (2012), 415-436**

In:

11. H. Xie, X. Xu, Mass Conservative Domain Decomposition Preconditioners for Multiscale Finite Volume Method, SIAM Journal on Multiscale Modeling and Simulation, 12(4), 2014,1667–1690

    *"Typically, the commonly used governing principles fall in the realm of multiphase flow in porous media [7, 9, **10**, 11, 12, 16, 17] in which the subsurface flow and transport of multiple components are governed by coupled differential equations of different type: an elliptic equation for pressure and a sequence of hyperbolic equations for component concentrations. Further complication*

arises from the heterogeneous and multiscale nature presented in the permeability field. Reliable numerical simulators are desired to handle these physical features accurately and robustly."

- **J. Kraus, M. Lymbery, S. Margenov Auxiliary space multigrid method based on additive Schur complement approximation, Numerical Linear Algebra with Applications (2014) DOI: 10.1002/nla.1959**

In:

12. L. Chen, J. Hu, X. Huang, Fast auxiliary space preconditioners for linear elasticity in mixed form, Mathematics of Computation (2018), 1601-1633

"As a two level method, the auxiliary space preconditioner involves smoothing on the fine level space which is usually the to-be-solved finite element space, and a coarse grid correction on an auxiliary space which is much more flexible to choose. It has been successfully applied to many finite element methods for partial differential equations, including conforming and nonconforming finite element method for the second order or fourth order problem [52, 53], H(curl) and H (div) problems [26, 33, 34, 47, 35], …"

- **S. Harizanov, R. Lazarov, P. Marinov, S. Margenov, Y. Vutov, Optimal Solvers for Linear Systems with Fractional Powers of Sparse SPD Matrices, Numerical Linear Algebra with Applications, Vol. 25 (5) (2018), https://doi.org/10.1002/nla.2167**

In:

13. S.L Wu, H. Zhang, T. Zhou, Solving time-periodic fractional diffusion equations via diagonalization technique and multigrid, Numerical Linear Algebra with Applications (2018), https://doi.org/10.1002/nla.2178

"*Alternatively, one can use a uniform best rational approximation [**16**], an exponentially convergent sinc quadrature [4], or a dimension extended PDE approach [23]. Any of these techniques suffice for our multigrid method, in particular for the smoother Richardson iterations. That is, the matrix A^{α} represented by its entry values is not necessarily to be built*."

14. C. Hofreither, A Unified View of Some Numerical Methods for Fractional Diffusion, Computers & Mathematics with Applications, Vol. 80 (2) (2020), 332-350

"A quite different approach has been proposed by Harizanov, Lazarov, Margenov, Marinov and Vutov [11] based on best uniform rational approximations (BURA). It is observed that, on the discrete level, the fractional diffusion problem may be viewed as taking a fractional matrix power of a standard stiffness matrix. In order to approximate the negative power −s of a matrix, a rational function approximating the mapping $z \to z^{-s}$ is constructed via a modified Remez algorithm. This rational function is then decomposed into partial fractions, which allows the computation of the approximate matrix power based only on inversions of spectrally equivalent shifted versions of the original (sparse) stiffness matrix."

15. T. Danczul, C. Hofreither, J. Schöberl, A unified rational Krylov method for elliptic and parabolic fractional diffusion problems, Numerical Linear Algebra with Applications, Vol. 30 (5) (2023) e2488, https://doi.org/10.1002/nla.2488

"Direct rational approximation methods have been employed in e.g., [38, 39, 40, 69] to alleviate the computational costs; see also [45]. The idea is to replace f^{τ} by a suitable rational function r^{τ} such that $r^{\tau}(L)b \approx f^{\tau}(L)b$."

- **R. Čiegis, V. Starikovičius, S. Margenov, R. Kriauzienė, A comparison of accuracy and efficiency of parallel solvers for fractional power diffusion problems, Parallel Processing and Applied Mathematics, PPAM 2017, Lecture Notes in Computer Science, Vol. 10777, Springer, Cham, (2018), https://doi.org/10.1007/978-3-319-78024-5_8**

16. A. Cortinovis, D. Kressner, Y. Nakatsukasa, Speeding up Krylov subspace methods for computing f (A)b via randomization, SIAM Journal on Matrix Analysis and Applications, Vol. 45 (1) (2024), 10.1137/22M1543458

"Matrix functions arise, for instance, in the solution of partial differential equations [7, 26], in data analysis [5, 12], and in electronic structure calculations [6]. In many of these applications, one is only interested in the product of f(A) with a b in R^n."

- **S. Harizanov, R. Lazarov, S. Margenov, P. Marinov, J. Pasciak, Analysis of numerical methods for spectral fractional elliptic equations based on the best uniform rational approximation, Journal of Computational Physics, Vol. 408 (2020), 109285, https://doi.org/10.1016/j.jcp.2020.109285**

17. R. Čiegis, P.N. Vabishchevich, Two-level schemes of Cauchy problem method for solving fractional powers of elliptic operators, Computers & Mathematics with Applications (2019), https://doi.org/10.1016/j.camwa.2019.08.012

"We mention also methods based on the best uniform rational approximation (BURA). Such methods enable users to get a sufficient accuracy of approximations, while keeping the computational complexity of BURA methods much smaller than for other popular methods. It should be noted that BURA methods are well fitted in cases of solutions of lower regularity when the right hand side f(x) for example is piecewise constant [16], [17]."

18. L. Banjai, J. M. Melenk, C. Schwab, Exponential convergence of hp FEM for spectral fractional diffusion in polygons, Numerische Mathematik, 153 (2023), 1–47, https://doi.org/10.1007/s00211-022-01329-5

"More generally, discretization of the SFL can be based on approximating xα by rational functions resulting in techniques proposed in [27, 28]."

19. B. Duan, Z. Yang, A quadrature scheme for steady-state diffusion equations involving fractional power of regularly accretive operator, SIAM Journal on Scientific Computing, Vol. 45 (5) (2023), 10.1137/22M1497298

"For numerical approximation for fractional powers of elliptic operators, most of the research papers focus on transplanting the nonlocal target problem into local systems, for example, by applying Gauss-Jacobi quadrature or trapezoidal rule to corresponding integral representations [1, 10], by Vabishchevich's idea [36, 16, 15], by the best uniform rational approximation [25, 26], and by the Caffarelli-Silvestre extension [31, 13], et al."

20. Y. Li, L. Zikatanov, C. Zuo, A reduced conjugate gradient basis method for fractional diffusion, SIAM Journal on Scientific Computing,(2024), https://doi.org/10.1137/23M1575913

"The classical method for constructing the best uniform rational approximation to a given function is the Remez algorithm (see [48]). Stable implementations of such algorithms require quadruple precision or exact arithmetic. The best uniform rational approximation $r(z) \approx z^{1-s}$ is used in [30, 29] to approximate z−s by r(z)/z and to solve fractional diffusion."

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