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**Prof. Valentina De Simone**

*Curriculum Vitae*

July, 2023

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**EDUCATION**

1999: PhD in Applied Mathematics and Computer Science, University of Naples "Federico II".

1993: MS Degree cum laude in Mathematics, University of Naples "Federico II".

**HABILITATION**

March 2017: Italian National Scientific Habilitation to Associate Professorship in Numerical Analysis.

June 2023: Italian National Scientific Habilitation to Full Professorship in Numerical Analysis.

**POSITIONS**

Sept. 2019-present: Associate Professor of Numerical Analysis, Department of Mathematics and Physics, University of Campania "Luigi Vanvitelli"

Nov. 2002-Aug. 2019: Assistant Professor of Numerical Analysis, Department of Mathematics and Physics, University of Campania "Luigi Vanvitelli".

**PROFESSIONAL EXPERIENCE**

2000-2002: Postdoc fellowship, Department of Mathematics and its Applications, University of Naples "Federico II".

1993-1994: CNR Fellow, Department of Mathematics and its Applications, University of Naples "Federico II".

**RESEARCH TOPICS**

The research activity is devoted to the development and analysis of numerical methods, algorithms and software for High-Performance Scientific Computing. The main research topics are:

- large-scale quadratic programming, with emphasis on interior point methods and iterative solution of related KKT systems;
- preconditioning of large and sparse saddle-point linear systems arising in nonlinear optimization and PDEs;
- nonsmooth optimization with applications in Image analysis and Portfolio Selection.

### **PARTICIPATION IN SCIENTIFIC PROJECTS (last 10 years)**

2023: "Modelli e metodi avanzati in Computer Vision", INdAM-GNCS Project.

2022: "Ottimizzazione adattiva per il machine learning", INdAM-GNCS Project.

2020-21: "Ottimizzazione Numerica in Image Restoration and Reconstruction", INdAM-GNCS Project.

2019: "Metodi avanzati di ottimizzazione non lineare per l'elaborazione di immagini", INdAM-GNCS Project.

2015-2018: "EoCoE - Energy oriented Centre of Excellence for computing applications", EU Horizon 2020 Project, Call H2020-EINFRA-2015-1.

2018: "Metodi numerici per equazioni lineari, non lineari e matriciali con applicazioni", INdAM-GNCS Project.

2017: "Metodi numerici per problemi di ottimizzazione vincolata di grandi dimensioni e applicazioni", INdAM-GNCS Project.

2016: "Nuove frontiere dell'ottimizzazione non differenziabile nei problemi inversi", INdAM-GNCS Project.

2015: Numerical Methods for Nonconvex/Nonsmooth Optimization and Applications, INdAM-GNCS Project (Scientific Coordinator)

2014: "First Order Optimization Methods for Image Restoration and Analysis", INdAM-GNCS Project.

2013: "Numerical Methods and Software for Large-Scale Optimization with Applications to Image Processing", INdAM-GNCS Project.

2012: "Advanced Numerical Methods for Preconditioning Linear Systems Arising from PDE and Optimization Problems", INdAM-GNCS Project.

2011: "Metodi numerici avanzati per problemi di ottimizzazione non lineare vincolata di grandi dimensioni", INdAM-GNCS Project.

### **PARTECIPATION IN PhD BOARDS**

From A.Y. 2018-19 to A.Y. 2021-22: PhD Program in Mathematics, Physics and Applications for Engineering, University of Campania "Luigi Vanvitelli".

### **PARTECIPATION IN EDITORIAL BOARDS**

1. Frontiers in Applied Mathematics and Statistics, Frontiers Media S.A. Field Chief Editor: Charles K. Chui. Print-ISSN: 22974687
2. Computational Optimization and Applications, Springer. Editor-in-Chief William W. Hager. Electronic ISSN:1573-2894, Print ISSN: 0926-6003.

### **TEACHING ACTIVITY**

Since A.Y. 2002-2003 Valentina De Simone has been teaching courses of Scientific Computing, Numerical Computing and Numerical Optimization (including applications to image processing), for undergraduate and graduate programs in Mathematics and in Mathematics and Computer Science at the University Campania "Luigi Vanvitelli" (formerly Second University of Naples).

#### AWARDS

1. COAP 2010 best paper award for the paper entitled "On mutual impact of numerical linear algebra and large-scale optimization with focus on interior point methods" published in Computational Optimization and Applications, Springer, Vol. 25, no. 2, pp. 283-310, 2010 (with Marco D'Apuzzo and Daniela di Serafino)
2. 2020 Selected Papers from Algorithms' Editorial Board Members for the paper entitled "Spatially Adaptive Regularization in Image Segmentation", Algorithms, 13, 226, 2020 (with Laura Antonelli and Daniela di Serafino)

#### RECENT PUBLICATIONS:

1. S. Crisci, V. De Simone, M. Viola, On the Adaptive Penalty Parameter Selection in ADMM, Algorithms, 16(6), 264, 2023, ISSN: 19994893 (doi: 10.3390/a16060264)
2. L. Antonelli, V. De Simone, M. Viola, Segmenting MR Images Through Texture Extraction and Multiplicative Components Optimization, In: Calatroni, L., Donatelli, M., Morigi, S., Prato, M., Santacesaria, M. (eds) Scale Space and Variational Methods in Computer Vision. SSVM 2023. Lecture Notes in Computer Science, vol 14009. Springer, 2023 (doi:10.1007/978-3-031-31975-4\_39)
3. L. Antonelli, V. De Simone, M. Viola, Cartoon-texture evolution for two-region image segmentation, Computational Optimization and Applications, 84(1), pp. 5–26, 2023, ISSN: 0926-6003 (doi: 10.1007/s10589-022-00387-7)
4. V. De Simone, D. di Serafino, J. Gondzio, S. Pougkakiotis, M Viola, Sparse Approximations with Interior Point Methods, SIAM REVIEW, vol. 64, p. 954-988, 2022, ISSN: 1095-7200, (doi: 10.1137/21M1401103)
5. S. Corsaro, V. De Simone, Z. Marino, Split Bregman iteration for multi-period mean variance portfolio optimization, Applied Mathematics and Computation, Volume 392, Article number 125715, 2021 (doi: 10.1016/j.amc.2020.125715).
6. S. Corsaro, V. De Simone, Z. Marino, Fused Lasso approach in portfolio selection, Annals of Operations Research, vol.299, p. 47-59, 2021, ISSN: 1572-9338, (doi: 10.1007/s10479-019-03289-w)
7. L. Antonelli, V. De Simone, D. di Serafino, Spatially Adaptive Regularization in Image Segmentation, Algorithms, 13(9), 226, 2020, ISSN: 19994893 (doi:10.3390/a13090226)
8. V. De Simone, D. di Serafino, M. Viola, A subspace-accelerated split Bregman method for sparse data recovery with joint l1-type regularizers, Electronic Transactions on Numerical Analysis, 53, pp. 406–42, 2020, ISSN: E1068–9613 (doi: 10.1553/etna\_vol53s406)
9. S. Corsaro, V. De Simone, Z. Marino, F. Perla, l1-Regularization for multi-period portfolio selection, Annals of Operations Research, vol. 294, p. 75-86, 2020, ISSN: 0254-5330, (doi:10.1007/s10479-019-03308-w)
10. S. Corsaro, V. De Simone, Adaptive  $\ell_1$ -regularization for short-selling control in portfolio selection, Computational Optimization and Applications, 72(2), pp. 457-478, 2019, ISSN: 0926-6003 (doi: 10.1007/s10589-018-0049-4)

11. L. Bergamaschi, V. De Simone, D. di Serafino, A. Martínez, BFGS-like updates of constraint preconditioners for sequences of KKT linear systems in quadratic programming, *Numerical Linear Algebra with Applications*, 2018 (online), ISSN: 1099-1506 (doi: 10.1002/nla.2144)
12. V. De Simone, D. di Serafino, B. Morini, On preconditioner updates for sequences of saddle-point linear systems, *Communications in Applied and Industrial Mathematics*, 9 (1), 2018, pp. 35-41, ISSN: 2038-0909 (doi: 10.1515/caim-2018-0003)
13. S. Corsaro, V. De Simone, Z. Marino, F. Perla, Numerical solution of the regularized portfolio selection problem, *Mathematical and Statistical Methods for Actuarial Sciences and Finance (MAF2018)*, Corazza, M., Durbán, M., Grané, A., Perna, C., Sibillo, M. (Eds.), 2018, Springer, ISBN: 978-3-319-89824-7
14. S. Bellavia, V. De Simone, D. di Serafino, B. Morini, On the update of constraint preconditioners for regularized KKT systems, *Computational Optimization and Applications*, 65 (2), 2016, pp. 339-360 ISSN: 0926-6003 (doi: 10.1007/s10589-016-9830-4)
15. L. Antonelli, V. De Simone, D. di Serafino, On the application of the spectral projected gradient method in image segmentation, *Journal of Mathematical Imaging and Vision*, 54 (1), 2016, pp. 106-116, ISSN: 0924-9907, published online in 2015 (doi: 10.1007/s10851-015-0591-y)
16. S. Bellavia, V. De Simone, D. di Serafino, B. Morini, Updating constraint preconditioners for KKT systems in quadratic programming via low-rank corrections, *SIAM Journal on Optimization*, 25 (3), 2015, pp. 1787-1808, ISSN: 1052-6234 (doi: 10.1137/130947155)
17. V. De Simone, D. di Serafino, A matrix-free approach to build band preconditioners for large-scale bound-constrained optimization, *Journal of Computational and Applied Mathematics*, 268, 2014, pp. 82-92, ISSN: 0377-0427 (doi: 10.1016/j.cam.2014.02.035)
18. A. Borzi, V. De Simone, D. di Serafino, Parallel algebraic multilevel Schwarz preconditioners for a class of elliptic PDE systems, *Computing and Visualization in Science*, 16 (1), 2013, pp. 1-14, ISSN: 1432-9360, published in 2014 (doi: 10.1007/s00791-014-0220-0)
19. S. Bellavia, V. De Simone, D. di Serafino, B. Morini, A preconditioning framework for sequences of diagonally modified linear systems arising in optimization, *SIAM Journal on Numerical Analysis*, 50 (6), 2012, pp. 3280-3302, ISSN: 0036-1429 (doi: 10.1137/110860707)
20. S. Bellavia, V. De Simone, D. di Serafino, B. Morini, Efficient Preconditioner Updates for Shifted Linear Systems, *SIAM Journal on Scientific Computing*, 33 (4), 2011, pp. 1785-1809, ISSN: 1064-8275 (doi: 10.1137/100803419)