

CURRICULUM VITAE

MARIA LUCIA SAMPOLI

EDUCATION

1994: Master Degree in Mathematics with 110/110 cum laude, University of Florence.

1998: PhD in Computational Mathematics and Operative Research, University of Milan.

PROFESSIONAL EXPERIENCE

2018 - : Associate Professor in Numerical Analysis, Department of Information Engineering and Mathematics, University of Siena

2003 – 2018 : Tenured Assistant Professor in Numerical Analysis, Department of Information Engineering and Mathematics, University of Siena;

2001– 2003: Assistant Professor in Numerical Analysis, Department of Mathematics and Computer Science, University of Siena;

2000– 2001: Research Assistant in Numerical Analysis, Department of Mathematics, University of Siena;

1999–2000: CNR Senior Fellow at Department of Mathematics, University of Siena;

1998: CNR Postdoc Fellow at Technische Universität Darmstadt, Fachbereich Mathematik (Germany).

TEACHING EXPERIENCE

Numerical Calculus, Numerical Analysis, Numerical methods for Graphics, Numerical Modelling, Computational Biology, Mathematical Software (Introduction to Maple), Computer Science basics.

RESEARCH INTERESTS

Computer Aided Geometric Design (CAGD), Isogeometric Analysis, PH curves and their applications, Constrained Interpolation and Approximation, Geometric Modeling.

Visiting Researcher:

- 2018, September, Department of Mechanical and Aerospace Engineering, University of California, Davis (USA).
- 2012, October 8–16, Institute of Mathematics, Physics and Mechanics, University of Ljubljana (Slovenia).
- 2008, June 5–12, Institute of Applied Geometry, Johannes Kepler University at Linz (Austria).
- 1998, May 1st - November 25: Dept. of Mathematics, Technical University of Darmstadt (Germany).
- 1996, February - June: Department of Mathematics, Dundee University (U.K.).

International collaborations:

- Prof. R.T. Farouki, Univ. of California at Davis (U.S.A.);
- Prof. Marjeta Knez (Krajnc), University of Ljubljana (Slovenia);
- Prof. B. Jüttler, Johannes Kepler University at Linz (Austria);
- Prof. Jean-Louis Merrien INSA-Rennes (France);
- Prof. E. Žagar, University of Ljubljana (Slovenia);
- Prof. G. Jaklič, University of Primorska, Koper (Slovenia);
- Prof. M. Peternell, Vienna University of Technology (Austria);

Invited speaker at International conferences (most recent):

1. INdAM Workshop: Fast Methods for Isogeometric Analysis, 5 – 9 Maggio 2025, Rome (Italy): *On Hierarchical spline refinement* (By invitation only);
2. Workshop SIGMA 2024 (Signal, Image, Geometry, Modeling, Approximation), 28 Ottobre – 2 Novembre 2024, Luminy (Francia): *Hierarchical matrices for 3D Helmholtz problems in multi-patch IgA-BEM setting* (By invitation only);
3. Dagstuhl Seminar on Geometric modeling: Challenges for Additive Manufacturing, Design and Analysis, 9 – 14 Giugno 2024, Dagstuhl (Germania): *C^1 simplex splines on a triangulation and numerical simulations* (By invitation only);
4. Advances in Computational Mechanics 2023, October 22 – 25 2023, Austin, TX (USA): *Efficient assembly in IgA-BEM by hierarchical matrices* (Invited speaker at minisymposium);
5. Third Conference of Young Applied Mathematicians (YAMC 2023), September 18 – 22 2023, Siena: *Isogeometric Boundary Element Methods* (Plenary speaker);
6. XXII Conference of the Italian Mathematical Union (UMI23), September 4 – 9 2023, Pisa: *Spatial Hermite interpolation with prescribed arc length* (invited speaker at Session);
7. SIAM Conference on Computational Science and Engineering (CSE23), February 26 – March 3 2023, Amsterdam (The Netherlands): *Isogeometric Boundary Element Methods for multi-patch geometries* (Invited speaker at minisymposium);
8. IGA 2022, November 6 – 9 2022, Banff (Canada): *Isogeometric BEM collocation for 3D acoustic problems using B-spline tailored numerical integration* (Invited speaker at minisymposium);
9. Curves and Surfaces 2022, June 20 – 24 2022, Arcachon (France): *Construction of G^2 Hermite interpolants with prescribed arc lengths* (Invited speaker at minisymposium);
10. Dagstuhl Seminar on Geometric Modeling, Interoperability and New Challenges, November 22 – 26 2021, Dagstuhl (Germany): *Geometric interpolation of Euler-Rodrigues frames with G^2 Pythagorean-hodograph curves of degree 7* (By invitation only);
11. Conference on Geometry: Theory and Applications, September 20 – 23 2021, Gozd Martuljek (Slovenia): *Isogeometric BEM collocation for 3D Laplace and Helmholtz problems* (Invited speaker at minisymposium);
12. 5th IM-Workshop on Applied Approximation, Signals and Images, February 24 – 28, 2020, Bernried (Germany): *Spline surfaces with C^1 quintic Pythagorean-hodograph isoparametric curves* (By invitation only);
13. INdAM Workshop: Geometric Challenges in Isogeometric Analysis, January 27 – 31, 2020, Rome (Italy): *Quadrature rules for singular integrals arising in IgA-BEM* (By invitation only);
14. Dagstuhl Seminar on Interactive Design and Simulation, December 15 – 20, 2019, Dagstuhl (Germany): *Quadrature Schemes based on quasi-interpolation for Boundary Element Methods in Isogeometric Analysis* (By invitation only);
15. International Conference on Isogeometric Analysis: IGA 2019, September 18 – 20, 2019, Munich (Germany): *Quadrature rules based on spline quasi-interpolation in IgA-BEM applications* (Invited speaker at minisymposium);
16. Multivariate Approximation and Interpolation with Applications (MAIA 2019), August 25–30 2019, Vienna (Austria): *Quasi-interpolation techniques for the numerical approximation of singular integrals involving a B-spline factor* (By invitation only);

17. International Conference on Approximation Theory: AT16, May 19–22, 2019, Nashville (USA): *An application of QI-based quadrature rules to Isogeometric Boundary Element Methods* (Invited speaker at minisymposium);
18. BIRS Workshop on "Isogeometric Splines: Theory and Applications", February 24 – March 1 2019, Banff (Canada): *Quadrature schemes based on spline quasi-interpolation for Galerkin IgA-BEM* (By invitation only);
19. INdAM Workshop: Design of Reliable, Exact, and Application-oriented techniques for geometric Modeling and numerical Simulation (DREAMS), January 22–26 2018, Rome (Italy): *New Quadrature Rules for IgA-BEM Applications* (By invitation only);
20. International Conference on Isogeometric Analysis: IGA 2017, September 11– 13 2017, Pavia (Italy): *New Quadrature Rules in Isogeometric Analysis for the Symmetric Galerkin Boundary Element Method* (Invited speaker at minisymposium);
21. Conference on Geometry: Theory and Applications, June 26 – 30 2017, Pilsen (Czech Rep): *Pythagorean-hodograph curves and their application to Geometric Modelling* (plenary speaker);
22. Dagstuhl Seminar on Geometric Modeling, Interoperability and New Challenges, May 28 – June 2 2017, Dagstuhl (Germany): *Spline-based quadrature schemes in Isogeometric Analysis for Boundary Element Methods* (By invitation only);
23. USACM Conference on Isogeometric Analysis and Mesh-free Methods, October 10–12 2016, La Jolla, CA (USA): *Isogeometric Analysis and Quadrature Rules for the Symmetric Galerkin Boundary Element Method* (Invited speaker at minisymposium);
24. 15th International Conference on Approximation Theory, May 22–25 2016, San Antonio, TX (USA): *Spline-based Numerical Schemes for Boundary Integral Equations* (Invited speaker at minisymposium);
25. SIMAI 2014, July 7–10 2014 Taormina (Italy): *Algebraic-geometric structures for rational camera motions* (Invited speaker at minisymposium);
26. Dagstuhl Seminar on Geometric Modeling, May 25–30 2014 Dagstuhl (Germany): *Isogeometric Analysis with Box Splines: A Preliminary Study* (By invitation only);
27. Industrial Geometry Closing Workshop, October 19–21 2011, Vienna (Austria): *Rotation-minimizing frames on space curves for camera motions* (Plenary speaker);

Referee of several International Journals (most recent)

Computer Aided Geometric Design, Computer-Aided Design, SIAM Journal of Numerical Analysis, Journal of Computational and Applied Mathematics, Computer Methods in Applied and Mechanical Engineering, Numerical Algorithms, Mathematics and Computers in Simulation, Applied Numerical Mathematics.

PUBLICATIONS

Journal Papers

- [1] L. Desiderio, G.A. D’Inverno, M.L. Sampoli and A. Sestini, Hierarchical matrices for 3D Helmholtz problems in the multi-patch IgA-BEM setting, *Engineering with Computers* (2025) 112670.
- [2] F. Pelosi, M. L. Sampoli and R. Farouki, Control point modifications that preserve the Pythagorean-hodograph nature of planar quintic curves, *Journal of Comp. and Appl. Math.* **457** (2025), 116301.
- [3] G.A. D’Inverno, M. Bianchini, M. L. Sampoli, F. Scarselli, On the approximation capability of GNNs in node classification/regression tasks, *Soft Computing* **28**(13-14) (2024), 8527–8547.

- [4] M. Knez, F. Pelosi, M.L. Sampoli, Construction of G^2 spatial interpolants with prescribed arc lengths, *Journal of Comp. and Appl. Math.* **441** (2024), 115684.
- [5] B. Degli Esposti, A. Falini, T. Kanduč, M.L. Sampoli, A. Sestini, IgA-BEM for 3D Helmholtz problems using conforming and non-conforming multi-patch discretizations and B-spline tailored numerical integration, *Computers and Mathematics with Applications* **147** (2023), 164–184.
- [6] R.T. Farouki, F. Pelosi, M.L. Sampoli, Construction of planar quintic Pythagorean-hodograph curves by control-polygon constraints, *Comput. Aided Geom. Design* **103** (2023), 102192
- [7] A. Falini, G.A. D’Inverno, M.L. Sampoli, F. Mazzia, Splines Parameterization of Planar Domains by Physics-Informed Neural Networks, *Mathematics* **11**(10)(2023), 2406.
- [8] M. Knez, F. Pelosi, M.L. Sampoli, Construction of G^2 planar Hermite interpolants with prescribed arc lengths, *Applied Math. and Comput.* **426** (2022), 127092.
- [9] N. Pancino, C. Graziani, V. Lachi, M.L. Sampoli, E. Sfeanescu, M. Bianchini, G.M. Dimitri, A mixed statistical and machine learning approach for the analysis of multimodal trail making test data, *Mathematics* **9**(24)(2021), 3159.
- [10] G.A. D’Inverno, S. Brunetti, M.L. Sampoli, A. Rufa, M. Bianchini, Visual sequential search test analysis: An algorithmic approach, *Mathematics* **9**(22) (2021), 2952.
- [11] A. Falini, M.L. Sampoli, Adaptive refinement in advection-diffusion problems by anomaly detection: A numerical study, *Algorithms* **14**(11) (2021), 328.
- [12] M. Knez, M.L. Sampoli, Geometric interpolation of ER frames with G^2 Pythagorean-hodograph curves of degree 7, *Comput. Aided Geom. Design* **88** (2021), 102001.
- [13] R.T. Farouki, F. Pelosi, M.L. Sampoli, Approximation of monotone clothoid segments by degree 7 Pythagorean-hodograph curves, *Journal of Comp. Appl. Math.* **382** (2021), 113110.
- [14] A. Aimi, F. Calabrò, A. Falini, M.L. Sampoli, and A. Sestini, Quadrature formulas based on spline Quasi-Interpolation for hypersingular integrals rising in Iga-SGBEM, *Comput. Methods Appl. Mech. Engrg.* **372** (2020), 113441.
- [15] M. Knez, F. Pelosi, M.L. Sampoli, Spline surfaces with C^1 quintic PH isoparametric curves, *Comput. Aided Geom. Design* **79** (2020), 101839.
- [16] R.T. Farouki, F. Pelosi, M.L. Sampoli, Optimization of Corner Blending Curves, *Computer Aided Design* **117** (2019), 1027–1039.
- [17] A. Falini, C. Giannelli, T. Kanduč, M.L. Sampoli, A. Sestini, An adaptive IgA-BEM with hierarchical B-splines based on quasi-interpolation quadrature schemes, *Int. J. Numer. Methods Eng.*, **117**(10) (2019), 1038–1058.
- [18] F. Calabrò, A. Falini, M.L. Sampoli, A. Sestini, Efficient quadrature rules based on spline quasi-interpolation for application to IGA-BEMs, *Journal of Comp. Appl. Math.* **338** (2018), 153–167.
- [19] A. Aimi, F. Calabrò, M. Diligenti, M. L. Sampoli, G. Sangalli, A. Sestini, Efficient assembly based on B-spline tailored quadrature rules for the IgA-SGBEM, *Comput. Methods Appl. Mech. Engrg.* **331** (2018), 327–342.
- [20] F. Pelosi, C. Giannelli, C. Manni, M. L. Sampoli, H. Speleers, Splines over regular triangulations in numerical simulations, *Computer Aided Design*, **82** (2017), 100–111.
- [21] A. Aimi, M. Diligenti, M.L. Sampoli, A. Sestini, Non-polynomial spline alternatives in Isogeometric Symmetric Galerkin BEM, *Appl. Num. Math.* **116** (2017), 10–23.

- [22] R.T. Farouki, F. Pelosi, M.L. Sampoli, A. Sestini, Tensor-product surface patches with Pythagorean-hodograph isoparametric curves, *IMA Journal of Numerical Analysis* **36**(3) (2016), 1389–1409.
- [23] A. Aimi, M. Diligenti, M. L. Sampoli, A. Sestini; Isogeometric Analysis and Symmetric Galerkin BEM: a 2D numerical study, *Appl. Math and Comput* **272** (2016), 173–186.
- [24] R.T. Farouki, C. Manni, M.L. Sampoli, Sestini A., Shape-preserving interpolation of spatial data by Pythagorean-hodograph quintic spline curves, *IMA Journal of Numerical Analysis* **35** (2015), 478–498.
- [25] Sestini A., Ferjancic K., Manni C., Sampoli M.L., A fully data-dependent criterion for free angles selection in spatial PH cubic biarc Hermite interpolation, *Comput. Aided Geom. Design* **31** (2014), 398–411.
- [26] Krajnc M., Sampoli M.L., Sestini A., Žagar E., C^1 interpolation by rational biarcs with rational rotation minimizing directed frames, *Comput. Aided Geom. Design* **31** (2014), 427–440.
- [27] Farouki R.T., Giannelli C., Sampoli M.L., Sestini A., Rotation-minimizing osculating frames, *Comput. Aided Geom. Design* **31** (2014), 27–42.
- [28] Jaklič G., Sampoli M.L., Sestini A., Žagar E., C^1 rational interpolation of spherical motions with rational rotation–minimizing directed frames, *Comput. Aided Geom. Design* **30** (2013), 159–173.
- [29] Speleers H., Manni C., Pelosi F., Sampoli M.L., Isogeometric analysis with Powell-Sabin splines for advection-diffusion-reaction problems, *Computer Methods in Applied Mechanics and Engineering* **221-222** (2012), 132-148.
- [30] C. Manni, F. Pelosi, M.L. Sampoli, Isogeometric analysis in advection-diffusion problems: Tension splines approximation, *Journal of Comp. Appl. Math.* **236**, (2011) 511–528.
- [31] C. Manni, F. Pelosi, M.L. Sampoli, Generalized B-splines as a tool in Isogeometric Analysis, *Computer Methods in Applied Mechanics and Engineering* **200**, (2011) 867–881.
- [32] P. Costantini, C. Manni, F. Pelosi, M.L. Sampoli, Quasi-interpolation in isogeometric analysis based on generalized B-splines, *Comput. Aided Geom. Design* **27** (2010), 656–668.
- [33] P. Costantini, F. Pelosi and M. L. Sampoli, New spline spaces with generalized tension properties, *BIT Numerical Mathematics*, **48** (4) (2008), 665–688.
- [34] I. Cravero, C. Manni and M.L. Sampoli, Geometric Construction of Quintic Parametric B-splines, *Journal of Comp. Appl. Math.*, **221** (2008), 355–366.
- [35] P. Costantini, F. Pelosi and M. L. Sampoli, Boolean Surfaces with Shape Constraints, *Computer Aided Design* **40** (2008), 62–75.
- [36] M. Peternell, B. Odhenal and M. L. Sampoli, On quadratic two-parameter families of spheres and their envelopes, *Computer Aided Geometric Design*, **25** (2008), 342–355.
- [37] F. Pelosi, M. L. Sampoli, R. T. Farouki and C. Manni, A control polygon scheme for design of planar C^2 PH quintic spline curves, *Computer Aided Geometric Design*, **24** (2007), 28-52.
- [38] M. L. Sampoli, M. Peternell and B. Jüttler, Rational surfaces with linear normals and their convolution with rational surfaces, *Computer Aided Geometric Design*, **23** (2006), 179-192.
- [39] M. L. Sampoli, Closed Spline Curves Bounding Maximal Area, *Rendiconti del Seminario Matematico dell'Università e del Politecnico di Torino*, **61** (2003), 377-391.
- [40] P. Costantini and M. L. Sampoli, A General Scheme for Shape Preserving Planar Interpolating Curves, *BIT*, **43** (2) (2003), 297–317.

- [41] B. Jüttler and M. L. Sampoli, Hermite interpolation by piecewise polynomial surfaces with rational offsets, *Computer Aided Geometric Design*, **17** (2000), 361–385.
- [42] M. L. Sampoli, Schemi risolutivi per la costruzione di curve interpolanti vincolate, *Bollettino della Unione Matematica Italiana* **2A** (1999), 197–200.
- [43] T. N.T. Goodman, B.H. Ong and M.L. Sampoli, Automatic interpolation by fair, shape preserving G^2 space curves, *Computer Aided Design* **30(10)** (1998), 813–822.

Publications on volumes (selected papers with referee)

- [44] A. Falini, C. Giannelli, T. Kanduč, M.L. Sampoli, and A. Sestini, A Collocation IGA-BEM for 3D Potential Problems on Unbounded Domains. In *Geometric Challenges in Isogeometric Analysis*, C. Manni, H. Speleers (eds), Springer INdAM Series **49** (2022), 31–47.
- [45] A. Falini, T. Kanduč, M.L. Sampoli, and A. Sestini, Cubature rules based on bivariate spline quasi-interpolation for weakly singular integrals. In *Approximation Theory XVI*, G. Fasshauer, M. Neamtu, L. L. Schumaker (eds), Springer (2021).
- [46] M.L. Sampoli, A. Sestini, G. Jaklič, E. Žagar, A theoretical analysis of an improved rational scheme for spherical camera motions. In: M. Floater et al. (eds.). *Mathematical Methods for Curves and Surfaces. Lecture Notes In Computer Science*, vol. 8177 (2013).
- [47] R.T. Farouki, C. Manni, F. Pelosi, M.L. Sampoli, Design of C^2 Spatial Pythagorean-Hodograph Quintic Spline Curves by Control Polygons, *Lecture Notes on Computer Sciences*, vol. 6920 (2011), 253–269.
- [48] P. Costantini, F. Pelosi and M. L. Sampoli, Compactly Supported Splines with Tension Properties on a Three-Direction Mesh, *Lecture Notes on Computer Sciences*, vol. 5862 (2010), 93–110.
- [49] M. Aigner, L. Gonzalez-Vega, B. Jüttler, M.L. Sampoli, Computing Isophotes on Free-form Surfaces based on Support Function Approximation, *Lecture Notes on Computer Sciences, Mathematics of Surfaces XIII* (2009), 1–18.
- [50] M. L. Sampoli and B. Jüttler, Support Function Representation for Curvature Dependent Surface Sampling, in *Applied and Industrial Mathematics in Italy III (AIMI III)*, E. De Bernardis, R. Spigler, V. Valente Eds. Word Scientific Press (2009).
- [51] P. Costantini, F. Pelosi and M.L. Sampoli, Triangular Surface Patches with Shape Constraints, in *Curve and Surface Design: Avignon 2006*, P. Chenin, T. Lyche, L.L. Schumaker (Eds.), Nashboro Press, TN, (2007), 123–132.
- [52] I. Cravero, C. Manni and M.L. Sampoli, High Smoothness Parametric B-splines, in *Curve and Surface Fitting: Avignon 2006*, A. Cohen, J.-L. Merrien, L.L. Schumaker (Eds.), Nashboro Press, TN, (2007), 91–100.
- [53] P. Costantini and M. L. Sampoli, Constrained Interpolation in R^3 by Abstract Schemes, in *Curve and Surface Design: Saint-Malo 2002*, M-L. Mazure and L.L. Schumaker (eds.), Nashboro Press, Brentwood, TN (2003), 93–102.
- [54] C. Manni and M. L. Sampoli, Parametric Comonotone Hermite Interpolation, in *Mathematical Methods for Curves and Surfaces II*, M. Daehlen, T. Lyche and L.L. Schumaker (eds.), Vanderbilt University Press, Nashville (1998), 343–350.
- [55] P. Costantini and M. L. Sampoli, Abstract Schemes and Construction of Constrained Interpolating Curves, in *Creating Fair and Shape-preserving Curves and Surfaces*, P. Kaklis and H. Nowacki (Eds.) Teubner Publishers, Stuttgart (1998), 121–130.

Proceedings

- [56] Sampoli M.L., Sestini A., Rational rotation-minimizing polar oriented rigid body motions. In: C. Rossi, M. Ceccarelli. Raad 2012 proceedings. 21st Int. Workshop on Robotics in Alpe-Adria-Danube Region, Edizioni Scientifiche ed Artistiche (2012), 284–291.
- [57] M. L. Sampoli, Computing the convolution and the Minkowski sum of surfaces, in *Proceedings of the 21st Spring Conference on Computer Graphics* ACM Digital Library (2005), 111–117.
- [58] P. Costantini and M. L. Sampoli, A general frame for the construction of constrained curves, in *Proceedings of the Conference on Applied Mathematics and Scientific Computing*, Z. Drmac, M. Marusic and Z. Tutek (eds.), Springer (2005), 41–66.
- [59] B. Jüttler and M. L. Sampoli, Zur Konstruktion polynomialer Splineflaechen mit rationaler Parallellaechen, *Proceedings of the 24th Workshop on Differential Geometry*, Technische Universität Darmstadt Publ., Darmstadt (1999), 33–40.

Siena, May 30 2025.