

CURRICULUM VITAE of TAKIS SAKKALIS – May 2016

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EDUCATION:

- Ph.D. University of Rochester, Rochester, NY, July 1986. Title: *An Algorithmic application of Morse Theory to real algebraic geometry*, D. Prill, Advisor.
- M.A. University of Rochester, Rochester, NY, May 1981.
- BSc in Mathematics, University of Athens, 1979.

PROFESSIONAL EXPERIENCE:

- Professor, Agricultural Univ. of Athens, June 24, 2005 —
- Director, Mathematics Laboratory, 8/10/2002 – 12/2014
- Research Affiliate, Department of Mechanical Engineering, Massachusetts Institute of Technology
- Visiting Associate Professor, Department of Mathematics and Statistics, Oakland University, Jan. 5, 2000–Aug. 15, 2000
- Associate Professor, Department of Science, Agricultural University of Athens, July 22, 1999–June 23, 2005
- Visiting Professor, Department of Ocean Engineering, Massachusetts Institute of Technology, Jan. 22 1996–March 15, 1996 & Jan. 11, 1997–Feb. 28, 1997 & Sept. 15, 1997–Sept. 22, 1997
- Assistant Professor, Agricultural University of Athens, May 4, 1994–July 21, 1999

- Assistant Professor, Oakland University, Rochester, MI 1990–94
- Assistant Professor, New Mexico State University, Las Cruces, NM 1988–90
- Visiting Scientist, IBM T.J. Watson Research Center, NY 1987–88
- Assistant Professor, New Mexico State University., Las Cruces, NM 1986–87.

RESEARCH INTERESTS:

- Real Algorithmic Algebraic Geometry
- Computer Algebra
- Computer Aided Geometric Design
- Geometric Modeling.

PROFESSIONAL ASSOCIATIONS:

Member of the Hellenic Mathematical Society.

ADDITIONAL PROFESSIONAL SERVICE:

- **Referee for the following journals:**
 - Computer Aided Geometric Design
 - Computer Aided Design
 - Mathematics of Computation
 - Journal of Symbolic Computation
 - Journal of Computational and Applied Mathematics
 - Mathematical Engineering in Industry
 - International Journal of Shape Modeling
 - ACM Transactions on Graphics
 - Advances in Computational Mathematics
 - ASME Transactions, JCISE.

- Member of the Editorial Board of *J. of Computational Design and Engineering*.

COLLABORATORS & Other Affiliations:

Z. Ligatsikas (Athens), T. Maekawa (MIT-Yokohama), Ch. Charitos (Athens), N. M. Patrikalakis (MIT), H. Pottmann (Wien), J. Wallner (Wien), R. T. Farouki (Davis), C. Cheng (Rochester, MI), S. Wang (Rochester, MI), D. Polemi (Athens), G. Shen, J. Yu (MIT), T. J. Peters, J. Bisceglia, K. Abe and A.C. Russell (UCONN), D.R. Ferguson (Boeing), C.M. Hoffmann (Purdue), N.F. Stewart (Canada), K.H. Ko (MIT, Korea), S. Frisch (Graz), C.Y. Han (Korea), L. Vaserstein (PSU).

Doctoral Graduate Student Committees: K. Pigounakis (NTUA), G. Shen (MIT), P. Vignolas (UTH), T. Kalinka (UoA).

Graduate students: P. Dospra (AUA).

PUBLICATIONS:

1. T. Sakkalis, The computation of the index of a Morse function at a critical point, *Intern. J. Math. & Math. Sci.* Vol. II, No. 4 (1988), 721–726. MR 90a:58026.
2. T. Sakkalis, Signs of algebraic numbers, *Computers and Mathematics*, Springer Verlag, (1989), 131–134. MR 90m:12004.
3. T. Sakkalis and R.T. Farouki, Singular points of algebraic curves, *J. Symbolic Computation*, 9 (1990), 405–421. MR 91f:14056.
4. T. Sakkalis, The Euclidean algorithm and the degree of the Gauss map, *SIAM J. Computing*, Vol. 19, No. 3 (1990), 538–543. MR 91m:68092.
5. R.T. Farouki and T. Sakkalis, Pythagorean hodographs, *IBM J. Research and Development*, Vol. 34, No. 5 (1990), 736–752. MR 92a:65063.
6. T. Sakkalis, On a theorem of H. Hopf, *Internat. J. Math. & Math. Sci.*, Vol. 13, No. 4 (1990), 813–816. MR 91k:57038.
7. T. Sakkalis, The topological configuration of a real algebraic curve, *Bulletin Austr. Math. Soc.*, Vol. 43, No. 1 (1991), 37–50. MR 92e:14056.
8. R.T. Farouki and T. Sakkalis, Real rational curves are not “unit speed”, *Computer Aided Geometric Design*, 8 (1991), 151–157. MR 92d:65034.

9. T. Sakkalis, On relations between Jacobians and resultants of polynomials in two variables, *Bulletin Austr. Math. Soc.*, 47 (1993), 473–481. MR 94e:12001.
10. T. Sakkalis and R.T. Farouki, Algebraically rectifiable parametric curves, *Computer Aided Geometric Design*, 10 (1993), 551–569. MR 95c:65028.
11. C. Cheng, T. Sakkalis and S. Wang, A case of the Jacobian conjecture, *J. Pure and Applied Algebra*, 96 (1994), 15–18. MR 95i:14018a.
12. D. Polemi and T. Sakkalis, Singular algebraic curves over finite fields, *Lecture Notes of Computer Science*, Springer Verlag Vol. 793, 24–37 (1993), MR 95i:14053.
13. R.T. Farouki and T. Sakkalis, Pythagorean–hodograph space curves, *Advances in Computational Mathematics* 2 (1994), 41–66. MR 95b:53003.
14. T. Sakkalis and Z. Ligatsikas, Computing the Topological Degree of Polynomial Maps, *Bull. Austral. Math. Soc.* Vol. 56 (1997), 87–94. MR 98g:55002.
15. T. Maekawa, N.M. Patrikalakis, T. Sakkalis and G. Yu, Analysis and Applications of Pipe Surfaces, *Computer Aided Geometric Design*, 15 5 (1998), 437–458. MR 99c:68254.
16. T. Sakkalis, Some Applications of the Resultant, *Bulletin of the Greek Mathematical Society*, Vol. 42, (1999), 89–95. MR 2002d:14097.
17. T. Sakkalis and Ch. Charitos, Approximating Curves via Alpha Shapes, *Graphical Models and Image Processing*, Vol. 61, No 3, (1999), 165–176.
18. T. Sakkalis, G. Shen and N.M. Patrikalakis, Representational Validity of Boundary Representation Models, *Computer Aided Design*, 32 (2000), 719–726.
19. T. Sakkalis, G. Shen and N.M. Patrikalakis, Topological and Geometric Properties of Interval Solid Models, *Graphical Models*, 63, 163–175 (2001).
20. G. Shen, T. Sakkalis and N.M. Patrikalakis, Boundary Representation Model Rectification, *Graphical Models*, 63, 177–195 (2001).
21. J. Wallner, T. Sakkalis, T. Maekawa, H. Pottmann and G. Yu, Self-Intersection of Offset Curves and Surfaces, *International Journal of Shape Modeling*, Vol. 7, No. 1, 1–21 (2001).
22. G. Shen, T. Sakkalis and N.M. Patrikalakis, A Rectification Algorithm for Manifold Boundary Representation Models. *Integrated Design and Manufacturing in Mechanical Engineering*, 129–138. P. Chedmail, G. Cognet, C. Fortin, C. Mascle and J. Pegna, Editors. Kluwer Publishing Company, 2002.

23. R.T. Farouki, M. al-Kandari and T. Sakkalis, Hermite interpolation by rotation-invariant spatial Pythagorean-hodograph curves, *Advances in Computational Mathematics*, 17: 369–383 (2002). MR 2003e:65011.
24. R.T. Farouki, M. al-Kandari and T. Sakkalis, Structural invariance of Spatial Pythagorean Hodographs, *Computer Aided Geometric Design*, 19 (2002) 395–407. MR 2003g:65019.
25. T. Sakkalis, Polynomial remainders and plane automorphisms, *Bulletin Austr. Math. Soc.* 68 (2003), no.1, 73–79. MR 2005a:14085.
26. C. Cheng and T. Sakkalis, Power linear maps of nilpotency index two, *Communications in Algebra*, Vol. 32, No. 7 (2004), 2635–2637. MR 2005f:14116.
27. T. Sakkalis, T. J. Peters and J. Bisceglia, Isotopic Approximations and Interval Solids, *Computer Aided Design*, 36(11), (2004), 1089–1100.
28. T. Sakkalis, A note on proper polynomial maps, *Communications in Algebra*, Vol. 33, No. 9 (2005), 3359–3365. MR 2006g:14096.
29. T.J. Peters, J. Bisceglia, D.R. Ferguson, C.M. Hoffmann, T. Maekawa, N.M. Patrikalakis, T. Sakkalis and N.F. Stewart, Computational Topology for Regular Closed Sets (within the I-TANGO Project), *On-line Journal Topology Atlas Invited Contributions*. Vol. 9, No. 1, pp. 12, 2004. Also archived at the Mathematics Archive.
30. K.H. Ko, T. Sakkalis and N.M. Patrikalakis, Resolution of multiple roots of nonlinear polynomial systems, *International J. of Shape Modeling*, Vol. 11, No. 1 (2005), 121–147.
31. K. Abe, J. Bisceglia, D.R. Ferguson, T.J. Peters, A.C. Russell, T. Sakkalis, Computational Topology for Isotopic Surface Reconstruction. *Theoretical Computer Science*, 365 (2006) 184–198.
32. R.T. Farouki and T. Sakkalis, Rational space curves are not “unit speed”, *Computer Aided Geometric Design*, 24 (2007) 238–240.
33. T. Sakkalis, The fundamental theorem of algebra. An elementary proof, *Bulletin of the Greek Mathematical Society*, Vol. 53, (2007), 131–134.
34. K.H. Ko, T. Sakkalis and N.M. Patrikalakis, A reliable algorithm for computing the topological degree of a mapping in \mathbb{R}^2 , *Applied Mathematics and Computation*, 196 (2008) 666–678.

35. T. Sakkalis, R.T. Farouki and L. Vaserstein, Non-existence of rational arc length parameterizations for curves in \mathbb{R}^n , *J. Computational and Applied Mathematics*, 228(2009) 494-497. MR2514307 (2010b:65039).
36. L. Vaserstein, T. Sakkalis and S. Frisch, Polynomial parametrization of Pythagorean tuples, *Int. J. Number Theory*, Vol. 6 (6) (2010), 1261-1272. MR2726581.
37. R.T. Farouki and T. Sakkalis, Rational rotation-minimizing frames on polynomial space curves of arbitrary degree, *J. Symbolic Computation*, Vol. 45 (8) (2010), 844-856. MR2657668 (2011f:65029).
38. R.T. Farouki and T. Sakkalis, Equivalence of distinct characterizations for rational rotation-minimizing frames on quintic space curves, *Computer Aided Geometric Design*, 28 (2011) 436-445. MR2836489.
39. R.T. Farouki and T. Sakkalis, A complete classification of quintic space curves with rational rotation-minimizing frames, *J. Symbolic Computation*, Vol. 47 (2) (2012), 214-226. MR2854857.
40. T. Sakkalis and R.T. Farouki, Pythagorean-hodograph curves in Euclidean spaces of dimension greater than 3, *J. Computational and Applied Mathematics*, 236 (2012) 4375-4382. MR2942433.
41. R.T. Farouki, C.Y. Han, P. Dospra and T. Sakkalis, Rotation-minimizing Euler-Rodrigues rigid-body motion interpolants, *Computer Aided Geometric Design*, 30 (2013) 653-671. MR3073231.
42. R.T. Farouki, P. Dospra and T. Sakkalis, Scalar-vector algorithm for the roots of quadratic quaternion polynomials, and the characterization of quintic rational rotation-minimizing frame curves, *J. Symbolic Computation*, Vol. 58 (2013), 1-17. MR3085081.
43. R.T. Farouki and T. Sakkalis, Corrigendum to "Rational rotation-minimizing frames on polynomial space curves of arbitrary degree" [*J. Symbolic Comput.* 45 (2010) 844-856], *J. Symbolic Computation*, Vol. 58 (2013), 99-102. MR3085086.
44. Kwanghee Ko and T. Sakkalis, Orthogonal projection of points in CAD/CAM applications: an overview, *J. of Computational Design and Engineering*, Vol. 1, No. 2 (2014), 116-127.
45. C. Cheng and T. Sakkalis, On new types of rational rotation-minimizing frame space curves, *J. Symbolic Computation*, Vol. 74 (2016), 400-407. MR3424049.

CITATIONS:

- There are over 690 publications (in scopus.com) citing my research. A complete list of these citations is available upon request.

INVITED TALKS:

- Shape Similarity, Keynote Speaker at the *International CAD Conference and Exhibition (CAD09)*. Reno, NV, June 08–12, 2009.
- Shape Interrogation, invited talk at the *International Summer School on Computational Methods for Shape*. Genoa, Italy, June 14–18, 2004.
- Tracing Surface Intersections with a Validated ODE System Solver, invited poster in the conference of *Solid Modeling and Applications SM'04*. Genoa, Italy, June 9–11, 2004.
- Nonlinear Polynomial Systems: Multiple Roots and their multiplicities, invited talk at *Shape Modeling and Applications SMI'04*. Genoa, Italy, June 7–9, 2004.
- I-TANGO (Intersections - Topology, Accuracy & Numerics for Geometric Objects, invited talk at *DARPA/NSF CARGO Review Meeting*, Madison, WI, May 17–20, 2004.
- I-TANGO (Intersections - Topology, Accuracy & Numerics for Geometric Objects, at *DARPA/NSF CARGO Computational and Algorithmic Representations of Geometric Objects*, Santa Rosa, CA, from May 12–14, 2003.

RESEACRH PROJECTS:

1. *Robust Reconstruction of Complex Curved Objects via Adaptive Sampling*. Principal Investigator: Prof. Nicholas M. Patrikalakis, Dept. of Ocean Engineering, MIT, Febr. 22, 1996. Funded by ONR. During this project I visited the Dept. of Ocean Engineering of MIT and did joint work with Prof. N. Patrikalakis, Dr. Maekawa and (then) graduate student Shen.
2. *I-TANGO: Intersections – Topology, Accuracy and Numerics for Geometric Objects (In Computer-Aided Design)*. T.J. Peters, N.F. Stewart, Univ. of Connecticut, C.M. Hoffmann, Purdue Univ., N.M. Patrikalakis, T. Maekawa and T. Sakkalis, Massachusetts Institute of Technology. August 29, 2001. Funded by NSF, January 2002. Duration three years.

3. *Topological Issues of Intersection Curves*. N.M. Patrikalakis, T. Maekawa and T. Sakkalis, Massachusetts Institute of Technology. **Funded by NSF**, September 2002. Duration two years.
4. *Computational Topology for Surface Reconstruction*. T. J. Peters, A. Russel, K. Abe, Univ. of Connecticut, T. Sakkalis (AI), Agric. Univ. of Athens. **Funded by NSF**, September 2002. Duration two years.