

Publications

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1 Books

1. Géométrie algorithmique. Ediscience international, 1995. In collaboration with M. Yvinec.
2. Algorithmic Geometry. Cambridge University Press, 1998. In collaboration with M. Yvinec.
3. Géométrie algorithmique : des données géométriques à la géométrie des données. Collège de France/Fayard, 2017.
4. Geometric and Topological Inference. Cambridge University Press, 2018. In collaboration with F. Chazal and M. Yvinec.

2 Edited books and special issues

1. Techniques de la robotique, Tome 1 : Architectures et commandes, Tome 2 : Perception et planification, Hermès, 1988. In collaboration with B. Faverjon and J.P. Merlet.
2. Geometry and Robotics, Springer Verlag, LNCS No. 391, 1989. In collaboration with J.P. Laumond.
3. Raisonnement géométrique, Numéro spécial de la revue d'intelligence artificielle, Vol. 3 No.2, 1989. In collaboration with J.P. Laumond.
4. Geometric Computing, special issue of the International Journal of Computational Geometry and Applications, Vol. 11, No. 1, 2001.
5. Algorithmic Foundations of Robotics V, Springer 2004. In collaboration with J. Burdick, K. Goldberg, S. Hutchinson.
6. Computational Geometry, Theory and Applications, Vol. 35 No. 1-2, August 2006. Special issue on the 20th ACM Symposium on Computational Geometry. In collaboration with J. Snoeyink.
7. Discrete and Computational Geometry, Vol. 36, No 4, December 2006. Special issue on the 20th ACM Symposium on Computational Geometry. In collaboration with J. Snoeyink.
8. Effective Computational Geometry for Curves and Surfaces, Springer, 2006. In collaboration with M. Teillaud.
9. Curves and Surfaces, Proc. of the 7th International Conference, Avignon, France, August 24-30, 2010, In collaboration with P. Chenin, A. Cohen, C. Gout, T. Lyche, M-L. Mazure and L. Schumaker. Springer Verlag LNCS Vol. 6920, 2012.

3 Book chapters

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2. Review of “An $n \log n$ algorithm for determining the congruity of polyhedra” by K. Sugihara, The Robotics Review, MIT Press, 1989.
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4. Automatic Modelling of Three-Dimensional Objects. In *Concise Encyclopedia of Modelling and Simulation*, D. P. Atherton and P. Borne Ed., Pergamon Press, 1992.
5. Application Challenges to Computational Geometry : CG Impact Task Force Report. (1996). In *Contemporary Mathematics : Advances in Discrete and Computational Geometry*, B. Chazelle , J. E. Goodman and R. Pollack Ed., American Mathematical Society, 1999. In collaboration with Computational Geometry Impact Task Force.
6. Optimal trajectories for nonholonomic mobile robots. In Jean-Paul Laumond, editor, *Robot Motion Planning and Control*, pp. 93–169, Springer, 1998. In collaboration with P. Souères.
7. Voronoi diagrams, triangulations and surfaces. In *Differential Geometry and Topology, Computational Geometry* J-M. Morvan and M. Boucetta Ed., NATO Science Series III : Computer and Systems Sciences, Vol. 197, 2005.
8. Curved Voronoi diagrams. In *Effective Computational Geometry for Curves and Surfaces*, Springer, 2006. In collaboration with C. Wormser and M. Yvinec.
9. Meshing of surfaces. In *Effective Computational Geometry for Curves and Surfaces*, Springer, 2006. In collaboration with D. Cohen-Steiner, B. Mourrain, G. Rote and G. Vegter.
10. Skeletal Structures. In Leila de Floriani and Michela Spagnuolo, editors, *Shape Analysis and Structuring, Mathematics and Visualization*. Springer, Berlin, 2007. In collaboration with S. Biasotti, D. Attali, H. Edelsbrunner, G. Elber, M. Mortara, G. Sanniti di Baja, M. Spagnuolo, M. Tanase.
11. Stability and computation of medial axes : a state-of-the-art report. In *Mathematical Foundations of Scientific Visualization, Computer Graphics, and Massive Data Exploration*, T. Möller, B. Hamann and B. Russell Ed., Springer, series Mathematics and Visualization In collaboration with D. Attali and H. Edelsbrunner, 2009.
12. From Segmented Images to Good Quality Meshes Using Delaunay Refinement In *Emerging Trends in Visual Computing*, F. Nielsen (Ed.). In collaboration with J-P. Pons and M. Yvinec, 2009.
13. Topological Data Analysis. In *Informatique Mathématique : une photographie en 2013*. Presse Universitaires de Perpignan, 2013. In collaboration with F. Chazal, M. Yvinec.

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2. Polyhedral Approximation of 3-D objects without holes, Computer Vision and Image Processing 25, 169-183 (1984). In collaboration with O. Faugeras, M. Hebert and P. Mussi.
3. Geometric Structures for 3-D shape Representation, ACM Trans. on Graphics, Octobre 1984.
4. Shape reconstruction from planar cross-sections, Computer Vision and Image Processing, 44, 1-29 (1988).
5. Polygon placement under translation and rotation, RAIRO Informatique Théorique, Vol.23, No. 1, 1989. In collaboration with F. Avnaim.
6. An optimal Algorithm for the Boundary of a Cell in a Union of Rays, Algorithmica (1990) 5 : 573-590. In collaboration with P. Alevizos and F. Preparata.
7. Representing Stereo Data with the Delaunay Triangulation, Artificial Intelligence, 44 (1990), 41-87. In collaboration with O. Faugeras and E. Lebras.
8. Non convex contour reconstruction, Journal of Symbolic Computation, Vol. 10, pp. 225–252 (1990). In collaboration with P. Alevizos and M. Yvinec.
9. Informatique et géométrie : quand l'ordinateur remplace la règle et le compas. Annales des Mines (Mai 1991).
10. Computing the union of 3-colored triangles, The Int. Journal of Computational Geometry and Applications, Vol.1, pp. 187–196 (1991). In collaboration with O. Devillers and F. Preparata.
11. Application of Random Sampling to On-line Algorithms in Computational Geometry, Discrete and Computational Geometry, Vol. 8, pp. 51–71 (1992). In collaboration with O. Devillers, R. Schott, M. Teillaud and M. Yvinec.
12. Probing a scene of non convex polyhedra, Algorithmica, Vol. 8, pp. 321–342 (1992). In collaboration with M. Yvinec.
13. Garer un robot mobile. Courier du CNRS, dossier scientifique sur la recherche en informatique (FÃ©vrier 1993). In collaboration with J-P. Laumond.
14. On the randomized construction of the Delaunay Tree, Theoretical Computer Science, Vol. 112, pp. 339–354 (1993). In collaboration with M. Teillaud.
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16. Shortest paths of bounded curvature in the plane. *Internat. J. Intell. Syst.*, Vol. 10, pp. 1–16 (1994). In collaboration with André Cérézo and Juliette Leblond.
17. Computing Connolly Surfaces. *J. Mol. Graphics*, 12 :61–62 (1994). In collaboration with O. Devillers, J. Duquesne and M. Yvinec.
18. Motion planning for a spider robot, *Internat. J. Comput. Geom. Appl.*, Vol. 5, No 1–2, 1995. In collaboration with O. Devillers, L. Donati and F. Preparata.
19. Output sensitive construction of the Delaunay triangulation of constrained point sets, *Internat. J. Comput. Geom. Appl.*, Vol. 6, No 1, 1996. In collaboration with A. Cerezo, O. Devillers and M. Teillaud.
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21. On computing four-finger equilibrium and force-closure grasps of polyhedral objects. *Internat. J. Robotics Research*, 1996. In collaboration with J. Ponce, S. Sullivan and J-P. Merlet.
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27. Convex tours of bounded curvature. *Comput. Geom. Theory Appl.*, 13 :149-160, 1999. In collaboration with Jurek Czyzowicz, Olivier Devillers, Jean-Marc Robert and Mariette Yvinec.
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32. Motion Planning of Legged Robots. *SIAM J. Comput.* 30, No. 1 (2000), pp. 218-246. In collaboration with O. Devillers and S. Lazard.
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48. From arteriographies to computational flow in saccular aneurisms : the INRIA experience. *Medical Image Analysis*. Volume 9, Issue 2, pp. 101-177 (April 2005). In collaboration with R. Chaine, P. Frey, G. Malandain, S. Salmon, E. Saltel, M. Thiriet.
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51. Learning smooth shapes by probing. *Comput. Geom. Theory Appl.* 37(1) : 38-58 (2007) In collaboration with L. Guibas, S. Oudot.
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53. Provably Good 2D Shape Reconstruction from Unorganized Cross-Sections. *Computer Graphics Forum*, 27 :1403-1410, 2008. In collaboration with P. Memari
54. Anisotropic diagrams : the Labelle Shewchuk approach revisited. *Theoretical Comp. Science* 408, 2008. In collaboration with C. Wormser, M. Yvinec.
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59. Geometric Tomography with Topological Guarantees. *Discrete and Computational Geometry*, Vol. 50, No 4, December 2013. In collaboration with O. Amini, P. Memari.
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61. The stability of Delaunay triangulations. *Int. J. on Computational Geometry and Applications (IJCGA)*. Vol. 23, No 4 & 5, pp. 303–333 (2014). In collaboration with R. Dyer, A. Ghosh.
62. The simplex tree : an efficient data structure for general simplicial complexes. *Algorithmica*. Vol. 70, No. 3 (2014). In collaboration with C. Maria.
63. Delaunay stability via perturbation. *Int. J. on Computational Geometry and Applications (IJCGA)*. Vol. 24, No. 2 (2014). In collaboration with R. Dyer, A. Ghosh.
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66. Anisotropic Delaunay Mesh Generation. *SIAM Journal on Computing*, Vol. 44, Issue 2, 2015. In collaboration with C. Wormser, M. Yvinec.
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73. An Efficient Representation for Filtrations of Simplicial Complexes. *ACM Transactions on Algorithms (TALG)*, Volume 14 Issue 4, August 2018. In collaboration with Karthik C.S.
74. Anisotropic triangulations via discrete Riemannian Voronoi diagrams. To appear in *SIAM Journal on Computing*, Volume 48, Issue 3, Page 1046-1097, January 2019. In collaboration with M. Rouxel-Labbé, M. Wintraecken.

75. Computing persistent homology with various coefficient fields in a single pass. *Journal of Applied and Computational Topology (APCT)*, Volume 3, Issue 1-2, June 2019. In collaboration with C. Maria.
76. The reach, metric distortion, geodesic convexity and the variation of tangent spaces. *Journal of Applied and Computational Topology (APCT)*, Volume 3, Issue 1-2, June 2019. In collaboration with A. Lieutier, M. Wintraecken.
77. Kernelization of the Subset General Position problem in Geometry. Submitted to *SIAM J. on Discrete Mathematics (SIDMA)*. In collaboration with K. Dutta, A. Ghosh, S. Kolay.
78. Strong Collapse for Persistence. Submitted to *Journal of Applied and Computational Topology (APCT)*. In collaboration with D. Pareek, S. Pritam.
79. Randomized incremental construction of Delaunay triangulations of nice point sets. Submitted to *Discrete and Computational Geometry (DCG)*. In collaboration with Olivier Devillers, Kunal Dutta, Marc Glisse.
80. Local conditions for triangulating submanifolds of Euclidean space. Submitted to *Discrete and Computational Geometry (DCG)*. In collaboration with R. Dyer, A. Ghosh, A. Lieutier, M. Wintraecken.

5 Conference papers

1. Modélisation et estimation /identification par variables d'état de la dynamique des satellites non rigides, GRETSI, Nice (Juin 1981). In collaboration with C. Darmon.
2. A New Approach to the Problem of Acquiring Randomly oriented Workpieces out of a bin, *Int. Joint Conf. on Artificial Intelligence*, Vancouver (Août 1981). In collaboration with F. Germain.
3. Triangulation of 3-D Objects. *Int. Joint Conf. on Artificial Intelligence*, Vancouver (Août 1981). In collaboration with O. Faugeras.
4. Positionnement stable d'une pince le long d'une silhouette. *Congrès AFCET Intelligence Artificielle et Reconnaissance des Formes*, Nancy (Octobre 1981).
5. Toward a flexible vision system. *Int. Symp. on Industrial Robots*, Paris (Juin 1982). In collaboration with O. Faugeras, F. Germain, G. Kryze, M. Hebert, J. Ponce.
6. Representation of objects by triangulating points in 3-D space. *Int. Conf. on Pattern Recognition*, Munich (Oct. 1982).
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11. Reconstruction of solids from planar cross-sections, IEEE Conf. on Computer Vision and Pattern Recognition San Francisco, 1985.
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15. Use of the Delaunay Triangulation for representing Stereo Data, IEEE Conf. on Computer Vision and Pattern Recognition, Miami, July 1986.
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17. An optimal $O(N \log N)$ algorithm for contour reconstruction from rays, 3rd ACM Symp. on Computational Geometry, Waterloo (June 1987). In collaboration P. Alevizos, M. Yvinec.
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20. Placement automatique de formes : une approche géométrique, Congrès AFCET Intelligence Artificielle et Reconnaissance des Formes, Antibes (Nov. 1987). In collaboration with F. Avnaim.
21. Polygon placement under translation and rotation, Symp. on Theoretical Aspects of Comp. Science, Bordeaux, Janvier 1988. In collaboration with F. Avnaim.
22. A practical exact motion planning algorithm for polygonal objects amidst polygonal obstacles, IEEE Int. Conf. on Robotics and Automation, Philadelphie (Avril 1988). In collaboration with F. Avnaim, B. Faverjon.

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41. From Spiders Robots to Half Disks Robots. 11th IEEE Internat. Conf. Robot. Autom. (1994). In collaboration with O. Devillers et S. Lazard.
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43. Shortest path synthesis for Dubins nonholonomic robot. IEEE Internat. Conf. Robot. Autom. (1994). In collaboration with X.-N. Bui, P. Souères, J.-P. Laumond.
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6 Patents

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2. Method of generating a grid on a heterogenous formation crossed by one or more geometric discontinuities in order to carry out simulations.

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4. Method and apparatus for fast automatic centerline extraction for virtual endoscopy. United States Patent Application 20050033114. Siemens Corporate Research (2004) Co-author B. Geiger.

7 Software

- One of the initiators of the CGAL library (see <http://www.cgal.org>)
- Initiator and chair of the Editorial Board of the GUDHI library (see <http://gudhi.gforge.inria.fr/>)
- Coauthor of NUAGES (3-D shape reconstruction from cross-sections), a software package commercialized by NOESIS, CRIL, Howmedica Leibinger GmbH (Pfizer Hospital Products Group) and Siemens Medical.
- Coauthor of PIAF (automatic layout of 2d shapes), a software package commercialized by NAKACHE.
- Coauthor of NUAGES-PC (3-D surface reconstruction from point clouds), a software package included in CATIA and commercialized by Dassault Systems.