

Bibliography

- [1] Abraham R, Marsden JE, & Ratiu T, *Manifolds, Tensor Analysis, and Applications*, volume 75 of *Applied Mathematical Sciences* (Springer-Verlag, New York), second edition (1988).
- [2] Abrams A, “Configuration spaces of colored graphs”. *Geom. Dedicata*, 92:185–194 (2002), dedicated to John Stallings on the occasion of his 65th birthday.
- [3] Adler RJ, *The Geometry of Random Fields* (Society for Industrial and Applied Mathematics) (1981).
- [4] Adler RJ, Bobrowski O, *et al.*, “Persistent homology for random fields and complexes”, in *Borrowing Strength: Theory Powering Applications*, 124–143 (IMS Collections) (2010).
- [5] Adler RJ & Taylor JE, *Random Fields and Geometry*, Springer Monographs in Mathematics (Springer, New York) (2007).
- [6] Alexander GP, Chen BG, *et al.*, “Colloquium: Disclination loops, point defects, and all that in nematic liquid crystals”. *Rev. Mod. Phys.*, 84:497–514 (2012).
- [7] Alexander JW, “A lemma on systems of knotted curves”. *Proc. Nat. Acad. Sci.*, 9:93–95 (1923).
- [8] Alexandrov P, “Über den allgemeinen Dimensionsbegriff und seine Beziehungen zur elementaren geometrischen Anschauung”. *Mathematische Annalen*, 98:617–635 (1928).
- [9] Amenta N, “Helly theorems and generalized linear programming”, in *Proceedings of the Ninth Annual Symposium on Computational Geometry*, SCG '93, 63–72 (ACM, New York, NY, USA) (1993).
- [10] Angenent S & van der Vorst R, “A superquadratic indefinite elliptic system and its Morse-Conley-Floer homology”. *Math. Z.*, 231 (2):203–248 (1999).
- [11] Arai Z, Kalies W, *et al.*, “A database schema for the analysis of global dynamics of multiparameter systems”. *SIAM J. Appl. Dyn. Syst.*, 8 (3):757–789 (2009).
- [12] Arnold DN, “Differential complexes and numerical stability”, in *Proceedings of the International Congress of Mathematicians, Vol. I (Beijing, 2002)*, 137–157 (Higher Ed. Press, Beijing) (2002).
- [13] Arnold DN, Falk RS, & Winther R, “Finite element exterior calculus, homological techniques, and applications”. *Acta Numer.*, 15:1–155 (2006).
- [14] Arnol'd VI, “The asymptotic Hopf invariant and its applications”. *Selecta Math. Soviet.*, 5 (4):327–345 (1986).
- [15] ———, *Mathematical Methods of Classical Mechanics*, volume 60 of *Graduate Texts in Mathematics* (Springer-Verlag, New York) (1989), translated from the 1974 Russian original by K. Vogtmann and A. Weinstein.

- [16] Arnol'd VI & Khesin BA, *Topological Methods in Hydrodynamics*, volume 125 of *Applied Mathematical Sciences* (Springer-Verlag, New York) (1998).
- [17] Arone G, "A note on the homology of Σ_n , the Schwartz genus, and solving polynomial equations", in *An Alpine Anthology of Homotopy Theory*, volume 399 of *Contemp. Math.*, 1–10 (Amer. Math. Soc., Providence, RI) (2006).
- [18] Arrow KJ & Debreu G, "Existence of an equilibrium for a competitive economy". *Econometrica*, 22:265–290 (1954).
- [19] Auroux D, "A beginner's introduction to Fukaya categories" (2013), arXiv:1301.7056.
- [20] Awodey S, *Category Theory* (Oxford University Press), 2nd edition (2010).
- [21] Banyaga A & Hurtubise D, *Morse Homology* (Springer) (2004).
- [22] Baryshnikov Y, "Unifying impossibility theorems: a topological approach". *Adv. in Appl. Math.*, 14 (4):404–415 (1993).
- [23] Baryshnikov Y, Bubenik P, & Kahle M, "Min-type morse theory for configuration spaces of hard spheres". *International Mathematics Research Notices* (2013).
- [24] Baryshnikov Y & Ghrist R, "Target enumeration via Euler characteristic integrals". *SIAM J. Appl. Math.*, 70 (3):825–844 (2009).
- [25] ———, "Euler integration over definable functions". *Proc. Natl. Acad. Sci. USA*, 107 (21):9525–9530 (2010).
- [26] ———, "Unimodal category and topological statistics", in *Proc. NOLTA: Nonlinear Theory & Applications*, 196–199 (2011).
- [27] Baryshnikov Y, Ghrist R, & Lipsky D, "Inversion of Euler integral transforms with applications to sensor data". *Inverse Problems*, 27 (12) (2011).
- [28] Baryshnikov Y, Ghrist R, & Wright M, "Hadwiger's Theorem for definable functions". *Adv. Math.*, 245:573–586 (2013).
- [29] Basener WF, *Topology and its Applications*, Pure and Applied Mathematics (Wiley-Interscience, Hoboken, NJ) (2006).
- [30] Bauer U, Kerber M, & Reininghaus J, "Clear and compress: computing persistent homology in chunks", in *Topological Methods in Data Analysis and Visualization III*, Mathematics and Visualization, 103–117 (2014).
- [31] Belchí F & Murillo A, "A-infinity persistence" (2014), arXiv:1403.2395.
- [32] Bell N & Hirani AN, "PyDEC: software and algorithms for discretization of exterior calculus". *ACM Trans. Math. Software*, 39 (1):41 (2012).
- [33] Ben-El-Mechaiekh H, Bich P, & Florenzano M, "General equilibrium and fixed point theory: a partial survey". *J. Fixed Point Theory Appl.*, 6 (2):207–226 (2009).
- [34] Bendich P & Harer J, "Persistent intersection homology". *Found. Comput. Math.*, 11 (3):305–336 (2010).
- [35] Bhattacharya S, Lipsky D, *et al.*, "Invariants for homology classes with application to optimal search and planning problem in robotics". *Ann. Math. Artif. Intell.*, 67 (3–4):251–281 (2013).
- [36] Billera LJ, "Homology of smooth splines: generic triangulations and a conjecture of Strang". *Trans. Amer. Math. Soc.*, 310 (1):325–340 (1988).
- [37] Billera LJ, Holmes SP, & Vogtmann K, "Geometry of the space of phylogenetic trees". *Adv. in Appl. Math.*, 27 (4):733–767 (2001).

- [38] Birman JS, *Braids, Links, and Mapping Class Groups*, number 82 in *Annals of Mathematics Studies* (Princeton University Press, Princeton, NJ.) (1974).
- [39] Birman JS & Williams RF, “Knotted periodic orbits in dynamical systems. I. Lorenz’s equations”. *Topology*, 22 (1):47–82 (1983).
- [40] ———, “Knotted periodic orbits in dynamical systems. II. Knot holders for fibered knots”, in *Low-dimensional topology (San Francisco, Calif., 1981)*, volume 20 of *Contemp. Math.*, 1–60 (Amer. Math. Soc., Providence, RI) (1983).
- [41] Blagojević PVM, Matschke B, & Ziegler GM, “A tight colored Tverberg theorem for maps to manifolds”. *Topology Appl.*, 158 (12):1445–1452 (2011).
- [42] Blum L, Shub M, & Smale S, “On a theory of computation and complexity over the real numbers: NP-completeness, recursive functions and universal machines”. *Bull. Amer. Math. Soc. (N.S.)*, 21 (1):1–46 (1989).
- [43] Blumberg AJ, Gal I, *et al.*, “Robust statistics, hypothesis testing, and confidence intervals for persistent homology on metric measure spaces”. *Found. Comput. Math.*, 14 (4):745–789 (2014).
- [44] Boczko E, Gedeon T, & Mischaikow K, “Dynamics of a simple regulatory switch”. *J. Math. Biol.*, 55 (5-6):679–719 (2007).
- [45] Bolsinov AV & Fomenko AT, *Integrable Hamiltonian systems: Geometry, Topology, Classification* (Chapman & Hall/CRC, Boca Raton, FL) (2004), translated from the 1999 Russian original.
- [46] Bott R & Tu L, *Differential Forms in Algebraic Topology* (Springer) (1982).
- [47] Bredon G, *Sheaf Theory* (Springer) (1997).
- [48] Bröcker L & Kuppe M, “Integral geometry of tame sets”. *Geom. Dedicata*, 82 (1-3):285–323 (2000).
- [49] Brown RF, *The Lefschetz Fixed Point Theorem* (Scott, Foresman and Co., Glenview, Ill.-London) (1971).
- [50] Bubenik P, de Silva V, & Scott J, “Metrics for generalized persistence modules” (2014), arXiv:1312.3829 [math.AT].
- [51] Bubenik P & Scott JA, “Categorification of persistent homology”. *Discrete Comput. Geom.*, 51 (3):600–627 (2014).
- [52] Burghelea D & Dey TK, “Topological persistence for circle-valued maps”. *Discrete and Computational Geometry*, 50 (1):1–30 (2011).
- [53] Cagliari F, Ferri M, & Pozzi P, “Size functions from a categorical viewpoint”. *Acta Applicandae Mathematicae*, 67 (3):225–235 (2001).
- [54] Carbinatto MC, Kwapisz J, & Mischaikow K, “Horseshoes and the Conley index spectrum”. *Ergodic Theory Dynam. Systems*, 20 (2):365–377 (2000).
- [55] Carlsson G, “Topology and data”. *Bull. Amer. Math. Soc. (N.S.)*, 46 (2):255–308 (2009).
- [56] Carlsson G & de Silva V, “Zigzag persistence”. *Found. Comput. Math.*, 10 (4):367–405 (2010).
- [57] Carlsson G, de Silva V, & Morozov D, “Zigzag persistent homology and real-valued functions”, in *Proceedings 25th ACM Symposium on Computational Geometry (SoCG)*, 247–256 (2009).

- [58] Carlsson G, Gorham J, *et al.*, “Computational topology for configuration spaces of hard disks”. *Phys. Rev. E*, 85 (2012).
- [59] Carlsson G, Ishkhanov T, *et al.*, “On the local behavior of spaces of natural images”. *International Journal of Computer Vision*, 76 (1):1–12 (2008).
- [60] Carlsson G & Mémoli F, “Classifying clustering schemes”. *Found. Comput. Math.*, 13 (2):221–252 (2013).
- [61] Carlsson G, Singh G, & Zomorodian A, “Computing multidimensional persistence”. *J. Comput. Geom.*, 1 (1):72–100 (2010).
- [62] Carlsson G & Zomorodian A, “The theory of multidimensional persistence”. *Discrete Comput. Geom.*, 42 (1):71–93 (2009).
- [63] Čech E, “Théorie générale de l’homologie dans un espace quelconque”. *Fund. Math.*, 19:149–183 (1932).
- [64] Chambers EW, de Silva V, *et al.*, “Vietoris-Rips complexes of planar point sets”. *Discrete Comput. Geom.*, 44 (1):75–90 (2010).
- [65] Chen B, “Minkowski algebra. I. A convolution theory of closed convex sets and relatively open convex sets”. *Asian J. Math.*, 3 (3):609–634 (1999).
- [66] Chichilnisky G & Heal G, “Necessary and sufficient conditions for a resolution of the social choice paradox”. *J. Econom. Theory*, 31 (1):68–87 (1983).
- [67] Cluckers R & Edmundo M, “Integration of positive constructible functions against Euler characteristic and dimension”. *J. Pure Appl. Algebra*, 208 (2):691–698 (2007).
- [68] Cluckers R & Loeser F, “Constructible motivic functions and motivic integration”. *Invent. Math.*, 173 (1):23–121 (2008).
- [69] Cohen RL, Jones JDS, & Segal GB, “Morse theory and classifying spaces” (1995), preprint.
- [70] Cohen-Steiner D, Edelsbrunner H, & Harer J, “Stability of persistence diagrams”. *Discrete Comput. Geom.*, 37 (1):103–120 (2007).
- [71] Coifman R, Shkolnisky Y, *et al.*, “Graph Laplacian tomography from unknown random projections”. *Image Processing, IEEE Transactions on*, 17 (10):1891–1899 (2008).
- [72] Conley C, *Isolated Invariant Sets and the Morse Index*, Regional conference series in mathematics (American Mathematical Society) (1978).
- [73] Conley C & Gardner R, “An application of the generalized Morse index to travelling wave solutions of a competitive reaction-diffusion model”. *Indiana Univ. Math. J.*, 33 (3):319–343 (1984).
- [74] Cornea O, Lupton G, *et al.*, *Lusternik-Schnirelmann Category*, volume 103 of *Mathematical Surveys and Monographs* (American Mathematical Society, Providence, RI) (2003).
- [75] Cowen N, Weingarten J, & Koditschek DE, “Visual servoing via navigation functions”. *IEEE Transactions on Robotics and Automation*, 18 (4):521–533 (2002).
- [76] Călugăreanu G, “Sur les classes d’isotopie des noeuds tridimensionnels et leurs invariants”. *Czech. Math. J.*, 11:588–625 (1961).
- [77] Curry J, *Sheaves, Cosheaves and Applications*, Ph.D. thesis, University of Pennsylvania (2014).
- [78] Curry J, Ghrist R, & Nanda V, “Discrete Morse theory for computing cellular sheaf cohomology”. *ArXiv e-prints* (2013).

- [79] Curry J, Ghrist R, & Robinson M, "Euler calculus with applications to signals and sensing", in *Advances in Applied and Computational Topology*, volume 70 of *Proc. Sympos. Appl. Math.*, 75–145 (Amer. Math. Soc., Providence, RI) (2012).
- [80] Curto C & Itskov V, "Cell groups reveal structure of stimulus space". *PLoS Comput. Biol.*, 4 (10):e1000205, 13 (2008).
- [81] Day S, Junge O, & Mischaikow K, "A rigorous numerical method for the global analysis of infinite-dimensional discrete dynamical systems". *SIAM J. Appl. Dyn. Syst.*, 3 (2):117–160 (2004).
- [82] Day S, Kalies WD, & Wanner T, "Verified homology computations for nodal domains". *Multiscale Model. Simul.*, 7 (4):1695–1726 (2009).
- [83] Day S, Kalies WD, *et al.*, "Probabilistic and numerical validation of homology computations for nodal domains". *Electron. Res. Announc. Amer. Math. Soc.*, 13:60–73 (electronic) (2007).
- [84] Day S, Lessard JP, & Mischaikow K, "Validated continuation for equilibria of PDEs". *SIAM J. Numer. Anal.*, 45 (4):1398–1424 (2007).
- [85] De Concini C, Procesi C, & Salvetti M, "Arithmetic properties of the cohomology of braid groups". *Topology*, 40 (4):739–751 (2001).
- [86] de Silva V & Carlsson G, "Topological estimation using witness complexes", in *Eurographics Symposium on Point-based Graphics*, M Alexa & S Rusinkiewicz, eds. (2004).
- [87] de Silva V & Ghrist R, "Coordinate-free coverage in sensor networks with controlled boundaries via homology". *International Journal of Robotics Research*, 25 (12):1205–1222 (2006).
- [88] ———, "Coverage in sensor networks via persistent homology". *Algebraic & Geometric Topology*, 7:339–358 (2007).
- [89] de Silva V, Morozov D, & Vejdemo-Johansson M, "Persistent cohomology and circular coordinates". *Discrete Comput. Geom.*, 45 (4):737–759 (2011).
- [90] de Silva V, Robbin JW, & Salamon DA, "Combinatorial Floer homology". *Mem. Amer. Math. Soc.*, 230 (1080):1–114 (2014).
- [91] Delfinado CJA & Edelsbrunner H, "An incremental algorithm for Betti numbers of simplicial complexes on the 3-sphere". *Computer Aided Geometric Design*, 12 (7):771–784 (1995).
- [92] Denef J & Loeser F, "Motivic integration and the Grothendieck group of pseudo-finite fields", in *Proceedings of the International Congress of Mathematicians, Vol. II (Beijing, 2002)*, 13–23 (Higher Ed. Press, Beijing) (2002).
- [93] Dequeant M, Ahnert S, *et al.*, "Comparison of pattern detection methods in microarray time series of the segmentation clock". *PLOS ONE*, 3 (8) (2008).
- [94] Desbrun M, Leok M, & Marsden JE, "Discrete Poincaré lemma". *Appl. Numer. Math.*, 53 (2-4):231–248 (2005).
- [95] Dimca A, *Sheaves in Topology* (Springer) (2004).
- [96] Dimitrov G, Fabian H, *et al.*, "Dynamical systems and categories" (2013), arXiv:1307.8418.
- [97] Dłotko P, Ghrist R, *et al.*, "Distributed computation of coverage in sensor networks by homological methods". *Appl. Algebra Engrg. Comm. Comput.*, 23 (1-2):29–58 (2012).

- [98] Dold A, *Lectures on Algebraic Topology*, Classics in Mathematics (Springer-Verlag, Berlin) (1995), reprint of the 1972 edition.
- [99] Dowden R, “World-wide lightning localization using VLF propagation in the earth-ionosphere waveguide”. *Antennas and Propagation Magazine*, 50 (5):40–60 (2008).
- [100] Dowker C, “Homology groups of relations”. *Annals of Mathematics*, 84–95 (1952).
- [101] Dwyer WG & Spaliński J, “Homotopy theories and model categories”, in *Handbook of Algebraic Topology*, 73–126 (North-Holland, Amsterdam) (1995).
- [102] Eckmann B, “Räume mit Mittelbildungen”. *Comment. Math. Helv.*, 28:329–340 (1954).
- [103] Edelsbrunner H & Harer J, “Persistent homology — a survey”, in *Surveys on Discrete and Computational Geometry: Twenty Years Later.*, JE Goodman, J Pach, & R Pollack, eds., volume 453 of *Contemporary Mathematics*, 257–282 (American Mathematical Society) (2008).
- [104] ———, *Computational Topology: an Introduction* (American Mathematical Society, Providence, RI) (2010).
- [105] Edelsbrunner H, Letscher D, & Zomorodian A, “Topological persistence and simplification”. *Discrete and Computational Geometry*, 28:511–533 (2002).
- [106] Eilenberg S & Montgomery D, “Fixed point theorems for multi-valued transformations”. *Amer. J. Math.*, 68:214–222 (1946).
- [107] Emrani S, Gentimis T, & Krim H, “Persistent homology of delay embeddings and its application to wheeze detection”. *IEEE Signal Process. Lett.*, 21 (4):459–463 (2014).
- [108] Erdmann M, “On the topology of discrete strategies”. *Int. J. Rob. Res.*, 29 (7):855–896 (2010).
- [109] ———, “On the topology of discrete planning with uncertainty”, in *Advances in Applied and Computational Topology*, volume 70 of *Proc. Sympos. Appl. Math.*, 147–194 (Amer. Math. Soc., Providence, RI) (2012).
- [110] Escolar E & Hiraoka Y, “Persistence modules on commutative ladders of finite type” (2014), preprint.
- [111] Fair R, “Digital microfluidics: Is a true lab-on-a-chip possible?” *Microfluidics and Nanofluidics*, 3 (3):245–281 (2007).
- [112] Farber M, “Topological complexity of motion planning”. *Discrete Comput. Geom.*, 29 (2):211–221 (2003).
- [113] ———, *Invitation to Topological Robotics*, Zurich Lectures in Advanced Mathematics (European Mathematical Society (EMS), Zürich) (2008).
- [114] Farber M & Grant M, “Robot motion planning, weights of cohomology classes, and cohomology operations”. *Proc. Amer. Math. Soc.*, 136 (9):3339–3349 (2008).
- [115] ———, “Topological complexity of configuration spaces”. *Proc. Amer. Math. Soc.*, 137 (5):1841–1847 (2009).
- [116] Farber M, Tabachnikov S, & Yuzvinsky S, “Topological robotics: motion planning in projective spaces”. *Int. Math. Res. Not.*, 34:1853–1870 (2003).
- [117] Farley D & Sabalka L, “On the cohomology rings of tree braid groups”. *J. Pure Appl. Algebra*, 212 (1):53–71 (2008).
- [118] ———, “Presentations of graph braid groups”. *Forum Math.*, 24 (4):827–859 (2012).

- [119] Federer H, *Geometric Measure Theory*, Die Grundlehren der mathematischen Wissenschaften, Band 153 (Springer-Verlag) (1969).
- [120] Ferri M, Frosini P, & Landi C, “Stable shape comparison by persistent homology”. *Atti Semin. Mat. Fis. Univ. Modena Reggio Emilia*, 58:143–162 (2011).
- [121] Flapan E, *When Topology Meets Chemistry* (Cambridge University Press) (2000).
- [122] Floer A, “Morse theory for Lagrangian intersections”. *J. Differential Geom.*, 28 (3):513–547 (1988).
- [123] Forman R, “Morse theory for cell complexes”. *Adv. Math.*, 134 (1):90–145 (1998).
- [124] ———, “Morse theory and evasiveness”. *Combinatorica*, 20 (4):489–504 (2000).
- [125] ———, “Combinatorial Novikov-Morse theory”. *Internat. J. Math.*, 13 (4):333–368 (2002).
- [126] ———, “A user’s guide to discrete Morse theory”. *Sém. Lothar. Combin.*, 48 (2002).
- [127] Fragouli C & Soljanin E, “Network coding fundamentals”. *Foundations and Trends in Networking*, 2 (1):1–133 (2007).
- [128] Franks J & Richeson D, “Shift equivalence and the Conley index”. *Trans. Amer. Math. Soc.*, 352 (7):3305–3322 (2000).
- [129] Franzosa RD, “The connection matrix theory for Morse decompositions”. *Trans. Amer. Math. Soc.*, 311 (2):561–592 (1989).
- [130] Freedman M, Gompf R, *et al.*, “Man and machine thinking about the smooth 4-dimensional Poincaré conjecture”. *Quantum Topology*, 1:171–208 (2010).
- [131] Freedman MH & He ZX, “Divergence-free fields: energy and asymptotic crossing number”. *Ann. of Math. (2)*, 134 (1):189–229 (1991).
- [132] Frosini P, “Measuring shape by size functions”, in *Proceedings of SPIE on Intelligent Robotic Systems*, volume 1607, 122–133 (1991).
- [133] ———, “Discrete computation of size functions”. *Journal of Combinatorics, Information & System Sciences*, 17 (3–4):232–250 (1992).
- [134] Fu JHG, “Curvature measures of subanalytic sets”. *Amer. J. Math.*, 116 (4):819–880 (1994).
- [135] Fulton W, *Algebraic Topology: A First Course*, volume 153 of *Graduate Texts in Mathematics* (Springer-Verlag) (1991).
- [136] Gabriel P, “Unzerlegbare Darstellungen I”. *Manuscripta Mathematica*, 6:71–103 (1972).
- [137] Gal ŠR, “Euler characteristic of the configuration space of a complex”. *Colloq. Math.*, 89 (1):61–67 (2001).
- [138] Gale D, “The game of Hex and the Brouwer fixed-point theorem”. *Amer. Math. Monthly*, 86 (10):818–827 (1979).
- [139] Gameiro M, Hiraoka Y, *et al.*, “Topological measurement of protein compressibility via persistent diagrams”. *Japan J. Industrial & Applied Mathematics* (2014), to appear.
- [140] Gameiro M, Lessard JP, & Mischaikow K, “Validated continuation over large parameter ranges for equilibria of PDEs”. *Math. Comput. Simulation*, 79 (4):1368–1382 (2008).
- [141] Gameiro M, Mischaikow K, & Kalies W, “Topological characterization of spatial-temporal chaos”. *Phys. Rev. E (3)*, 70 (3):035203, 4 (2004).
- [142] Gelfand SI & Manin YI, *Methods of Homological Algebra*, Springer Monographs in Mathematics (Springer-Verlag, Berlin), second edition (2003).

- [143] Ghrist R, "Branched two-manifolds supporting all links". *Topology*, 36 (2):423–448 (1997).
- [144] ———, "Barcodes: the persistent topology of data". *Bull. Amer. Math. Soc. (N.S.)*, 45 (1):61–75 (2008).
- [145] ———, "Configuration spaces, braids, and robotics", in *Braids*, volume 19 of *Lect. Notes Ser. Inst. Math. Sci. Natl. Univ. Singap.*, 263–304 (World Sci. Publ., Hackensack, NJ) (2010).
- [146] Ghrist R & Hiraoka Y, "Sheaves for network coding", in *Proc. NOLTA: Nonlinear Theory and Applications*, 266–269 (2011).
- [147] Ghrist R & Holmes PJ, "An ODE whose solutions contain all knots and links". *Internat. J. Bifur. Chaos Appl. Sci. Engrg.*, 6 (5):779–800 (1996).
- [148] Ghrist R & Kin E, "Flowlines transverse to knot and link fibrations". *Pacific J. Math.*, 217 (1):61–86 (2004).
- [149] Ghrist R & Koditschek DE, "Safe cooperative robot dynamics on graphs". *SIAM J. Control Optim.*, 40 (5):1556–1575 (2002).
- [150] Ghrist R & Krishnan S, "A topological max-flow-min-cut theorem", in *Proc. Global Sig. Inf. Proc.* (2013).
- [151] Ghrist R, Lipsky D, *et al.*, "Surrounding nodes in coordinate-free networks", in *Algorithmic foundation of robotics VII*, volume 47 of *Springer Tracts Adv. Robot.*, 409–424 (Springer, Berlin) (2008).
- [152] ———, "Topological landmark-based navigation and mapping" (2012), preprint.
- [153] Ghrist R & Peterson V, "The geometry and topology of reconfiguration". *Adv. in Appl. Math.*, 38 (3):302–323 (2007).
- [154] Ghrist R & Robinson M, "Euler-Bessel and Euler-Fourier transforms". *Inverse Problems*, 27 (12) (2011).
- [155] Ghrist R, Van den Berg JB, & Vandervorst RC, "Morse theory on spaces of braids and Lagrangian dynamics". *Invent. Math.*, 152 (2):369–432 (2003).
- [156] Ghrist R & Vandervorst RC, "Scalar parabolic PDEs and braids". *Trans. Amer. Math. Soc.*, 361 (5):2755–2788 (2009).
- [157] Godement R, *Topologie Algébrique et Théorie des Faisceaux* (Herman, Paris) (1958).
- [158] Goerss PG & Jardine JF, *Simplicial Homotopy Theory*, Modern Birkhäuser Classics (Birkhäuser Verlag, Basel) (2009), reprint of the 1999 edition.
- [159] Goguen JA, "Sheaf semantics for concurrent interacting objects". *Mathematical Structures in Computer Science*, 2 (02):159–191 (1992).
- [160] Goldblatt R, *Topoi: the Categorical Analysis of Logic*, volume 98 of *Studies in Logic and the Foundations of Mathematics* (North-Holland Publishing Co., Amsterdam), second edition (1984).
- [161] Golubitsky M & Guillemin V, *Stable Mappings and Their Singularities* (Springer-Verlag, New York) (1973).
- [162] Gompf RE, "An exotic menagerie". *J. Differential Geom.*, 37 (1):199–223 (1993).
- [163] Goresky M & MacPherson R, *Stratified Morse Theory*, volume 14 of *Ergebnisse Der Mathematik Und Ihrer Grenzgebiete*. (Springer-Verlag) (1988).

- [164] ———, “Local contribution to the Lefschetz fixed point formula”. *Invent. Math.*, 111 (1):1–33 (1993).
- [165] Gottlieb DH, “Topology and the robot arm”. *Acta Appl. Math.*, 11 (2):117–121 (1988).
- [166] Gromov M, “Pseudoholomorphic curves in symplectic manifolds”. *Invent. Math.*, 82 (2):307–347 (1985).
- [167] Guckenheimer J & Holmes P, *Nonlinear Oscillations, Dynamical Systems, and Bifurcations of Vector Fields*, volume 42 of *Applied Mathematical Sciences* (Springer-Verlag, New York) (1983).
- [168] Guibas L, Ramshaw L, & Stolfi J, “A kinetic framework for computational geometry”, in *Proc. IEEE Sympos. Found. Comput. Sci.* (1983).
- [169] Guillemin V & Pollack A, *Differential Topology* (AMS Chelsea Publishing, Providence, RI) (2010), reprint of the 1974 original.
- [170] Guillermou S, Kashiwara M, & Schapira P, “Sheaf quantization of Hamiltonian isotopies and applications to nondisplaceability problems”. *Duke Math. J.*, 161 (2):201–245 (2012).
- [171] Gundert A & Wagner U, “On Laplacians of random complexes”, in *Proceedings of the Twenty-eighth Annual Symposium on Computational Geometry*, SoCG '12, 151–160 (ACM, New York, NY, USA) (2012).
- [172] Guseĭn-Zade SM, “Integration with respect to the Euler characteristic and its applications”. *Uspekhi Mat. Nauk*, 65 (3):5–42 (2010).
- [173] Gutierrez A, Monaghan D, *et al.*, “Persistent homology for 3D reconstruction evaluation”, in *Computational topology in image context*, volume 7309 of *Lecture Notes in Comput. Sci.*, 139–147 (Springer, Heidelberg) (2012).
- [174] Hadwiger H, “Integralsätze im Konvexring”. *Abh. Math. Sem. Univ. Hamburg*, 20:136–154 (1956).
- [175] Hales T, “What is motivic measure?” *Bull. Amer. Math. Soc.*, 42 (2):119–135 (2005).
- [176] Hatcher A, *Algebraic Topology* (Cambridge University Press) (2002).
- [177] Haynes GC, Cohen FR, & Koditschek DE, “Gait transitions for quasi-static hexapedal locomotion on level ground”, in *Robotics Research*, C Pradalier, R Siegwart, & G Hirzinger, eds., volume 70 of *Springer Tracts in Advanced Robotics*, 105–121 (Springer Berlin Heidelberg) (2011).
- [178] Herlihy M & Shavit N, “The topological structure of asynchronous computability”. *J. ACM*, 46 (6):858–923 (1999).
- [179] Hirsch MW, *Differential Topology*, volume 33 of *Graduate Texts in Mathematics* (Springer-Verlag, New York) (1994), corrected reprint of the 1976 original.
- [180] Hussein SY, Lasry JM, & Magill MJP, “Existence of equilibrium with incomplete markets”. *J. Math. Econom.*, 19 (1-2):39–67 (1990).
- [181] Hutson V, Mischaikow K, & Poláčik P, “The evolution of dispersal rates in a heterogeneous time-periodic environment”. *J. Math. Biol.*, 43 (6):501–533 (2001).
- [182] Hutson V, Mischaikow K, & Vickers GT, “Multiple travelling waves in evolutionary game dynamics”. *Japan J. Indust. Appl. Math.*, 17 (3):341–356 (2000).
- [183] Iversen B, *Cohomology of Sheaves* (Springer) (1986).
- [184] Jardine JF, “Homotopy theories of diagrams”. *Theory Appl. Categ.*, 28 (11):269–303 (2013).

- [185] Jiang X, Lim LH, *et al.*, “Statistical ranking and combinatorial Hodge theory”. *Math. Program.*, 127 (1, Ser. B):203–244 (2011).
- [186] Kaczynski T, Mischaikow K, & Mrozek M, *Computational Homology*, volume 157 of *Applied Mathematical Sciences* (Springer-Verlag, New York) (2004).
- [187] Kakutani S, “A generalization of Brouwer’s fixed point theorem”. *Duke Math. J.*, 8:457–459 (1941).
- [188] Kalies W, Mischaikow M, & Vandervorst RC, “Conley theory” (2014), in preparation.
- [189] Kapovich M & Millson JJ, “Universality theorems for configuration spaces of planar linkages”. *Topology*, 41 (6):1051–1107 (2002).
- [190] Kashiwara M, “On the maximally overdetermined system of linear differential equations. I”. *Publ. Res. Inst. Math. Sci.*, 10:563–579 (1974/75).
- [191] Kashiwara M & Schapira P, *Sheaves on Manifolds* (Springer) (1990).
- [192] ———, *Categories and Sheaves*, volume 332 of *Grundlehren der Mathematischen Wissenschaften* (Springer-Verlag) (2006).
- [193] Kato G, *The Heart of Cohomology* (Springer, Dordrecht) (2006).
- [194] Kleinberg J, “An impossibility theorem for clustering”, in *Proc. NIPS*, 446–453 (MIT Press) (2002).
- [195] Koditschek D & Buehler M, “Analysis of a simplified hopping robot”. *International Journal of Robotics Research*, 10 (6):587–605 (1991).
- [196] Koetter R & Medard M, “An algebraic approach to network coding”. *IEEE/ACM Transactions on Networking*, 11 (5):782–795 (2003).
- [197] Kozlov D, “Discrete Morse theory for free chain complexes”. *Comptes Rendus Mathématique*, 340:867–872 (2005).
- [198] ———, *Combinatorial Algebraic Topology*, volume 21 of *Algorithms and Computation in Mathematics* (Springer) (2008).
- [199] Kramár M, Goullet A, *et al.*, “Quantifying force networks in particulate systems”. *Phys. D*, 283:37–55 (2014).
- [200] Krishnan S, “Directed Poincaré duality” (2013), preprint.
- [201] ———, “Flow-cut dualities for sheaves” (2014), arXiv:1409.6712.
- [202] Kuperberg K, “Counterexamples to the Seifert conjecture”, in *Proceedings of the International Congress of Mathematicians, Vol. II (Berlin, 1998)*, Extra Vol. II, 831–840 (electronic) (1998).
- [203] Kurland HL, “The Morse index of an isolated invariant set is a connected simple system”. *J. Differential Equations*, 42 (2):234–259 (1981).
- [204] Latschev J, “Vietoris-Rips complexes of metric spaces near a closed Riemannian manifold”. *Archiv der Mathematik*, 77:522–528 (2001).
- [205] Leinster T, *Basic Category Theory* (Cambridge University Press) (2014).
- [206] Leray J, “Sur la forme des espaces topologiques et sur les points fixes des représentations”. *Journal de Math.*, 24:95–167 (1945).
- [207] Lesnick M, “The theory of the interleaving distance on multidimensional persistence modules” (2011), arXiv:1106.5305.

- [208] Lewiner T, Lopes H, & Tavares G, “Applications of Forman’s discrete Morse theory to topology visualization and mesh compression”. *IEEE Trans. Visualization & Comput. Graphics*, 10 (5):499–508 (2004).
- [209] Lewis R & Zomorodian A, “Multicore homology via Mayer Vietoris” (2014), arXiv:1407.2275.
- [210] Lipsky D, Skraba P, & Vejdemo-Johansson M, “A spectral sequence for parallelized persistence” (2011), arXiv:1112.1245.
- [211] Mac Lane S, *Categories for the Working Mathematician*, volume 5 of *Graduate Texts in Mathematics* (Springer-Verlag, New York), second edition (1998).
- [212] Mac Lane S & Moerdijk I, *Sheaves in Geometry and Logic: A first introduction to Topos Theory*, Universitext (Springer-Verlag, New York) (1994), corrected reprint of the 1992 edition.
- [213] MacPherson R & Schweinhart B, “Measuring shape with topology”. *J. Math. Phys.*, 53 (7):073516, 13 (2012).
- [214] MacPherson R & Srolovitz D, “The von Neumann relation generalized to coarsening of three-dimensional microstructures”. *Nature*, 446:1053–1055 (2007).
- [215] MacPherson RD, “Chern classes for singular algebraic varieties”. *Ann. of Math. (2)*, 100:423–432 (1974).
- [216] Margalef-Roig J & Outerelo Dominguez E, *Differential Topology* (North-Holland), first edition (1992).
- [217] Marsden JE & Ratiu TS, *Introduction to Mechanics and Symmetry*, volume 17 of *Texts in Applied Mathematics* (Springer-Verlag, New York), second edition (1999).
- [218] Massey WS, *A Basic Course in Algebraic Topology*, volume 127 of *Graduate Texts in Mathematics* (Springer-Verlag, New York) (1991).
- [219] Matoušek J, *Using the Borsuk-Ulam Theorem: Lectures on Topological Methods in Combinatorics and Geometry* (Springer) (2003).
- [220] May JP, *Simplicial Objects in Algebraic Topology*, Chicago Lectures in Mathematics (University of Chicago Press, Chicago, IL) (1992), reprint of the 1967 original.
- [221] ———, *A Concise Course in Algebraic Topology*, Chicago Lectures in Mathematics (University of Chicago Press, Chicago, IL, University of Chicago Press) (1999).
- [222] McCord C & Mischaikow K, “Connected simple systems, transition matrices, and heteroclinic bifurcations”. *Trans. Amer. Math. Soc.*, 333 (1):397–422 (1992).
- [223] McDonald T & Schenck H, “Piecewise polynomials on polyhedral complexes”. *Adv. in Appl. Math.*, 42 (1):82–93 (2009).
- [224] McDuff D & Salamon D, *Introduction to Symplectic Topology*, Oxford Mathematical Monographs (Oxford University Press), second edition (1998).
- [225] Milnor J, “Differential topology forty-six years later”. *Notices Amer. Math. Soc.*, 58 (6):804–809 (2011).
- [226] Milnor JW & Stasheff JD, *Characteristic Classes*, number 76 in *Annals of Mathematics Studies* (Princeton University Press) (1974).
- [227] Mirollo RE & Strogatz SH, “Synchronization of pulse-coupled biological oscillators”. *SIAM Journal on Applied Mathematics*, 50 (6):1645–1662 (1990).
- [228] Mischaikow K, “Topological techniques for efficient rigorous computation in dynamics”. *Acta Numer.*, 11:435–477 (2002).

- [229] Mischaikow K, Mrozek M, *et al.*, “Construction of symbolic dynamics from experimental time series”. *Physical Review Letters*, 82 (6):1144 (1999).
- [230] Mischaikow K & Nanda V, “Morse theory for filtrations and efficient computation of persistent homology”. *Discrete Comput. Geom.*, 50 (2):330–353 (2013).
- [231] Misner CW, Thorne KS, & Wheeler JA, *Gravitation* (W. H. Freeman and Co., San Francisco, Calif.) (1973).
- [232] Moffatt HK, “The degree of knottedness of tangled vortex lines”. *Journal of Fluid Mechanics*, 35 (01):117–129 (1969).
- [233] Morgan J & Tian G, *Ricci Flow and the Poincaré Conjecture*, volume 3 of *Clay Mathematics Monographs* (2007).
- [234] Morvan JM, *Generalized Curvatures*, volume 2 of *Geometry and Computing* (Springer-Verlag, Berlin) (2008).
- [235] Muhammad A & Jadbabaie A, “Distributed computation of homology groups by gossip.”, in *Proceedings of American Control Conference (ACC)* (2007).
- [236] Mumford D, “Pattern theory: the mathematics of perception”. *Proc. Intl. Congress of Mathematicians, Vol. III*, 1–21 (2002).
- [237] Mumford D, Lee A, & Pedersen K, “The nonlinear statistics of high-contrast patches in natural images”. *Intl. J. Computer Vision*, 54:83–103 (2003).
- [238] Munkres J, *Topology* (Prentice Hall) (2000).
- [239] Nash JF Jr, “Equilibrium points in n -person games”. *Proc. Nat. Acad. Sci. U. S. A.*, 36:48–49 (1950).
- [240] Nicolaescu LI, “Tame flows”. *Mem. Amer. Math. Soc.*, 208 (980) (2010).
- [241] Niyogi P, Smale S, & Weinberger S, “Finding the homology of submanifolds with high confidence from random samples”. *Discrete & Computational Geometry*, 39:419–441 (2008).
- [242] Pachter L & Sturmfels B, “The mathematics of phylogenomics”. *SIAM Rev.*, 49 (1):3–31 (2007).
- [243] Penrose R, “La cohomologie des figures impossibles”. *Structural Topology*, 17:11–16 (1991).
- [244] Pratt V, “Modelling concurrency with geometry”, in *Proc. 18th Symp. on Principles of Programming Languages* (1991).
- [245] Prue P & Scrimshaw T, “Abrams’s stable equivalence for graph braid groups”. *Topology and Its Applications*, 178:136–145 (2014).
- [246] Quillen DG, *Homotopical Algebra*, Lecture Notes in Mathematics, No. 43 (Springer-Verlag, Berlin-New York) (1967).
- [247] Rice SO, “Mathematical analysis of random noise”. *Bell System Tech. J.*, 24:46–156 (1945).
- [248] Rimon E & Koditschek DE, “Exact robot navigation using artificial potential functions”. *IEEE Transactions on Robotics and Automation*, 8 (5):501–518 (1992).
- [249] Rimon E, Mason R, *et al.*, “A general stance stability test based on stratified Morse theory with application to quasi-static locomotion planning”. *IEEE Transactions on Robotics*, 626–641 (2008).

- [250] Rizzi AA & Koditschek DE, "The control of a robot juggler", in *Proceedings Third International Symposium on Experimental Robotics* (Kyoto, Japan) (1993).
- [251] Robins V, "Towards computing homology from finite approximations", in *Proceedings of the 14th Summer Conference on General Topology and its Applications* (Brookville, NY, 1999), volume 24, 503–532 (1999).
- [252] Robins V, Wood P, & Sheppard A, "Theory and algorithms for constructing discrete Morse complexes from grayscale digital images". *IEEE Transactions on Pattern Analysis and Machine Intelligence*, 33 (8):1646–1658 (2011).
- [253] Robinson M, "Inverse problems in geometric graphs using internal measurements, arxiv:1008.2933" (2010).
- [254] ———, "Asynchronous logic circuits and sheaf obstructions". *Electronic Notes in Theoretical Computer Science*, 159–177 (2012).
- [255] ———, "The Nyquist theorem for cellular sheaves", in *Proc. Global Sig. Inf. Proc.* (2013).
- [256] ———, *Topological Signal Processing* (Springer, Heidelberg) (2014).
- [257] Robinson M & Ghrist R, "Topological localization via signals of opportunity". *IEEE Trans. Signal Process.*, 60 (5):2362–2373 (2012).
- [258] Robinson RC, *An Introduction to Dynamical Systems — Continuous and Discrete*, volume 19 of *Pure and Applied Undergraduate Texts* (American Mathematical Society, Providence, RI), second edition (2012).
- [259] Rodriguez A, Mason M, & Ferry S, "From caging to grasping". *International Journal of Robotics Research*, 31 (7):886–900 (2012).
- [260] Rolfsen D, *Knots and Links*, volume 7 of *Mathematics Lecture Series* (Publish or Perish, Inc., Houston, TX) (1990), corrected reprint of the 1976 original.
- [261] Rot TO & Vandervorst RCAM, "Morse-Conley-Floer homology". *J. Topol. Anal.*, 6 (3):305–338 (2014).
- [262] Rota GC, "On the combinatorics of the Euler characteristic", in *Studies in Pure Mathematics (Presented to Richard Rado)*, 221–233 (Academic Press, London) (1971).
- [263] Roweis S & Saul L, "Nonlinear dimensionality reduction by locally linear embedding". *Science*, 290:2323–2326 (2000).
- [264] Ruelle D, "Dynamical zeta functions and transfer operators". *Notices Amer. Math. Soc.*, 49 (8):887–895 (2002).
- [265] Sahai T, Speranzon A, & Banaszuk A, "Wave equation based algorithm for distributed eigenvector computation", in *Proceedings of IEEE Conference on Decision and Control (CDC)* (2010).
- [266] Salamon D, "Connected simple systems and the Conley index of isolated invariant sets". *Trans. Amer. Math. Soc.*, 291 (1):1–41 (1985).
- [267] Salehi AT & Jadbabaie A, "Distributed coverage verification in sensor networks without location". *IEEE Transactions on Automatic Control*, 55 (8):1837–1849 (2010).
- [268] Schanuel SH, "Negative sets have Euler characteristic and dimension", in *Category Theory (Como, 1990)*, volume 1488 of *Lecture Notes in Math.*, 379–385 (Springer, Berlin) (1991).
- [269] Schapira P, "Operations on constructible functions". *J. Pure Appl. Algebra*, 72 (1):83–93 (1991).

- [270] ———, “Tomography of constructible functions”, in *Applied Algebra, Algebraic Algorithms and Error-Correcting Codes*, 427–435 (Springer) (1995).
- [271] Schenck H, “A spectral sequence for splines”. *Adv. in Appl. Math.*, 19 (2):183–199 (1997).
- [272] Schürmann J, *Topology of Singular Spaces and Constructible Sheaves*, volume 63 of *Mathematics Institute of the Polish Academy of Sciences. Mathematical Monographs (New Series)* (Birkhäuser Verlag, Basel) (2003).
- [273] Schwartzman S, “Asymptotic cycles”. *Ann. of Math. (2)*, 66:270–284 (1957).
- [274] Schwarz M, *Morse Homology*, volume 111 of *Progress in Mathematics* (Birkhäuser Verlag, Basel) (1993).
- [275] Seidel P, “Fukaya categories and deformations”, in *Proceedings of the International Congress of Mathematicians, Vol. II (Beijing, 2002)*, 351–360 (Higher Ed. Press, Beijing) (2002).
- [276] Shepard A, *A Cellular Description of the Derived Category of a Stratified Space*, Ph.D. thesis, Brown University (1985).
- [277] Shiota M, *Geometry of Subanalytic and Semialgebraic Sets*, Progress in Mathematics (Birkhäuser) (1997).
- [278] Smale S, “Algorithms for solving equations”, in *Proceedings of the International Congress of Mathematicians, Vol. 1, 2 (Berkeley, Calif., 1986)*, 172–195 (Amer. Math. Soc., Providence, RI) (1987).
- [279] Smoller J, *Shock Waves and Reaction-Diffusion Equations*, volume 258 of *Grundlehren der Mathematischen Wissenschaften* (Springer-Verlag, New York-Berlin) (1983).
- [280] Spanier EH, *Algebraic Topology* (McGraw-Hill Book Co., New York) (1966).
- [281] Spielman D, “Algorithms, graph theory, and linear equations in Laplacian matrices”, in *Proc. Intl. Congress of Mathematicians* (2010).
- [282] Spivak D, “Category theory for scientists” (2013), arXiv:1302.6946.
- [283] Su FE, “Rental harmony: Sperner’s lemma in fair division”. *Amer. Math. Monthly*, 106 (10):930–942 (1999).
- [284] Sullivan D, “Cycles for the dynamical study of foliated manifolds and complex manifolds”. *Invent. Math.*, 36:225–255 (1976).
- [285] Sumners DW, “Lifting the curtain: using topology to probe the hidden action of enzymes”. *Notices Amer. Math. Soc.*, 42 (5):528–537 (1995).
- [286] Szymczak A, “The Conley index for discrete semidynamical systems”. *Topology Appl.*, 66 (3):215–240 (1995).
- [287] Tanner HG, Jadbabaie A, & Pappas GJ, “Flocking in fixed and switching networks”. *Automatic Control, IEEE Transactions on*, 52 (5):863–868 (2007).
- [288] Tenenbaum JB, de Silva V, & Langford JC, “A global geometric framework for nonlinear dimensionality reduction”. *Science*, 290:2319–2323 (2000).
- [289] Tesfatsion L, “Pure strategy Nash equilibrium points and the Lefschetz fixed point theorem”. *Internat. J. Game Theory*, 12 (3):181–191 (1983).
- [290] Thurston WP, *Three-Dimensional Geometry and Topology. Vol. 1*, volume 35 of *Princeton Mathematical Series* (Princeton University Press, Princeton, NJ) (1997), edited by Silvio Levy.

- [291] Univalent Foundations Program, *Homotopy Type Theory: Univalent Foundations of Mathematics* (<http://homotopytypetheory.org/book>, Institute for Advanced Study) (2013).
- [292] van den Berg JB, Mireles-James JD, *et al.*, “Rigorous numerics for symmetric connecting orbits: even homoclinics of the Gray-Scott equation”. *SIAM J. Math. Anal.*, 43 (4):1557–1594 (2011).
- [293] van den Dries L, *Tame Topology and O-minimal Structures*, London Mathematical Society Lecture Note Series (Cambridge University Press) (1998).
- [294] van Hateren J & van der Schaff A, “Independent component filters of natural images compared with simple cells in primary visual cortex”. *Proc. R. Soc. of London, vol B*, 265:359–366 (1998).
- [295] Vasil'ev VA, “Cohomology of braid groups and the complexity of algorithms”. *Funktional. Anal. i Prilozhen.*, 22 (3):15–24, 96 (1988).
- [296] Vietoris L, “Über den höheren Zusammenhang kompakter Räume und eine Klasse von zusammenhangstreuen Abbildungen”. *Math. Ann.*, 97 (1):454–472 (1927).
- [297] Viro O, “Some integral calculus based on Euler characteristic”. *Lecture Notes in Mathematics*, 1346:127–138 (1988).
- [298] Vybornov M, “Constructible sheaves on simplicial complexes and Koszul duality”. *Mathematical Research Letters*, 5 (675):675–683 (1998).
- [299] Walker K, *Configuration spaces of linkages*, Undergraduate thesis, Princeton University (1985).
- [300] Weibel CA, *An Introduction to Homological Algebra*, volume 38 of *Cambridge Studies in Advanced Mathematics* (Cambridge University Press, Cambridge) (1994).
- [301] Weinberger S, “On the topological social choice model”. *J. Econom. Theory*, 115 (2):377–384 (2004).
- [302] Worsley KJ, “Local maxima and the expected Euler characteristic of excursion sets of χ^2 , F and t fields”. *Adv. in Appl. Probab.*, 26 (1):13–42 (1994).
- [303] ———, “Estimating the number of peaks in a random field using the Hadwiger characteristic of excursion sets, with applications to medical images”. *Ann. Statist.*, 23 (2):640–669 (1995).
- [304] Yuzvinsky S, “Modules of splines on polyhedral complexes”. *Math. Z.*, 210 (2):245–254 (1992).
- [305] Zomorodian A, *Topology for Computing* (Cambridge Univ Press) (2005).
- [306] Zomorodian A & Carlsson G, “Computing persistent homology”. *Discrete Comput. Geom.*, 33 (2):249–274 (2005).