

# List of Publications

May 2024

RENZO LUIGI RICCA

## Articles in Primary Journals and Refereed Volumes

- [1] **Ricca, R.L.** (1991) Intrinsic equations for the kinematics of a classical vortex string in higher dimensions. *Physical Review A* **43**, 4281-4288.
- [2] **Ricca, R.L.** (1991) Rediscovery of Da Rios equations. *Nature* **352**, 561-562.
- [3] Moffatt, H.K. & **Ricca, R.L.** (1991) Interpretation of invariants of the Betchov-Da Rios equations and of the Euler equations. In *The Global Geometry of Turbulence* (ed. J. Jimenez), NATO ASI B **268**, pp. 257-264. Plenum Press.
- [4] **Ricca, R.L.** & Moffatt, H.K. (1992) The helicity of a knotted vortex filament. In *Topological Aspects of the Dynamics of Fluids and Plasmas* (ed. H.K. Moffatt *et al.*), pp. 225-236. Kluwer.
- [5] **Ricca, R.L.** (1992) Physical interpretation of certain invariants for vortex filament motion under LIA. *Phys. Fluids A* **4**, 938-944.
- [6] Moffatt, H.K. & **Ricca, R.L.** (1992) Helicity and the Călugăreanu invariant. *Proc. R. Soc. A* **439**, 411-429. [Also: (1995) *Knots and Applications* (ed. L.H. Kauffman), pp. 251-269. World Scientific.]
- [7] **Ricca, R.L.** (1993) Torus knots and polynomial invariants for a class of soliton equations. *Chaos* **3**, 83-91. [1995 Erratum. *Chaos* **5**, 346.]
- [8] **Ricca, R.L.** (1994) The effect of torsion on the motion of a helical vortex filament. *J. Fluid Mech.* **273**, 241-259.
- [9] **Ricca, R.L.** (1994) Writhe and twist helicity contributions to an isolated magnetic flux tube and hammock configuration. In *Poster Papers Presented at the VII European Meeting on Solar Physics* (ed. G. Belvedere *et al.*), pp. 151-154. Catania Astrophys. Observatory, Catania.
- [10] **Ricca, R.L.** (1995) The energy spectrum of a twisted flexible string under elastic relaxation. *J. Phys. A: Math. & Gen.* **28**, 2335-2352.
- [11] **Ricca, R.L.** (1995) Geometric and topological aspects of vortex filament dynamics under LIA. In *Small-Scale Structures in Three-Dimensional Hydro and Magneto-hydrodynamics Turbulence* (ed. M. Meneguzzi *et al.*), pp. 99-104. Lecture Notes in Physics **462**. Springer-Verlag.
- [12] **Ricca, R.L.** (1996) The contributions of Da Rios and Levi-Civita to asymptotic potential theory and vortex filament dynamics. *Fluid Dyn. Res.* **18**, 245-268.
- [13] **Ricca, R.L.** & Berger, M.A. (1996) Topological ideas and fluid mechanics. *Phys. Today* **49** (12), 24-30. [Also in Japanese: (1997) *Parity* **10**, 20-28.]
- [14] **Ricca, R.L.** (1996) Minimum energy configurations of a twisted flexible string under elastic relaxation. In *ZAMM-ICIAM/GAMM 95* (ed. E. Kreuzer & O. Mahrenholtz), pp. 421-422. Applied Sciences (Contributed Papers) **5**. Akademie Verlag, Berlin.
- [15] **Ricca, R.L.** (1997) Evolution and inflexional instability of twisted magnetic flux tubes. *Solar Physics* **172**, 241-248.
- [16] Samuels, D.C, Barenghi, C.F. & **Ricca, R.L.** (1998) Quantized vortex knots. *J. Low Temp. Physics* **110**, 509-514.

- [17] **Ricca, R.L.** (1998) Applications of knot theory in fluid mechanics. In *Knot Theory* (ed. V.F.R. Jones *et al.*), pp. 321-346. Banach Center Publ. **42**, Polish Academy of Sciences, Warsaw.
- [18] **Ricca, R.L.** (1998) New developments in topological fluid mechanics: from Kelvin's vortex knots to magnetic knots. In *Ideal Knots* (ed. A. Stasiak *et al.*), pp. 255-273. Series on Knots and Everything **19**, World Scientific.
- [19] **Ricca, R.L.**, Samuels, D.C. & Barenghi, C.F., (1998) Vortex knots. In *Advances in Turbulence VII* (ed. U. Frisch), pp. 369-372. Kluwer.
- [20] **Ricca, R.L.**, Barenghi, C.F. & Samuels, D.C. (1999) Evolution of vortex knots. *J. Fluid Mech.* **391**, 29-44.
- [21] **Ricca, R.L.** (2000) Towards a complexity measure theory for vortex tangles. In *Knots in Hellas '98* (ed. C. McA. Gordon *et al.*), pp. 361-379. Series on Knots and Everything **24**, World Scientific.
- [22] **Ricca, R.L.** (2000) Knots and braids on the Sun. In *Science and Art Symposium 2000* (ed. A. Gyr *et al.*), pp. 263-268. Kluwer.
- [23] Barenghi, C.F., **Ricca, R.L.** & Samuels, D.C. (2001) How tangled is a tangle? *Physica D* **157**, 197-206.
- [24] **Ricca, R.L.** (2001) Geometric and topological aspects of vortex motion. In *An Introduction to the Geometry and Topology of Fluid Flows* (ed. R.L. Ricca), pp. 203-228. NATO ASI Series II, **47**, Kluwer.
- [25] **Ricca, R.L.** (2001) Tropicity and complexity measures for vortex tangles. In *Quantized Vortex Dynamics and Superfluid Turbulence* (ed. C.F. Barenghi *et al.*), pp. 366-372. Springer Lecture Notes in Physics **571**, Springer-Verlag.
- [26] **Ricca, R.L.** (2002) Energy, helicity and crossing number relations for complex flows. In *Tubes, Sheets and Singularities in Fluid Dynamics* (ed. K. Bajer & H.K. Moffatt), pp. 139-144. NATO ASI Series, Kluwer.
- [27] Barenghi, C.F., Samuels, D.C. & **Ricca, R.L.** (2002) Complexity measures of tangled vortex filaments. *Tubes, Sheets and Singularities in Fluid Dynamics* (ed. K. Bajer & H.K. Moffatt), pp. 69-74. NATO ASI Series, Kluwer.
- [28] **Ricca, R.L.** (2005) Knot theory. In *Encyclopedia of Nonlinear Science* (ed. A. Scott), pp. 499-501. Routledge, New York and London.
- [29] **Ricca, R.L.** (2005) Structural complexity. In *Encyclopedia of Nonlinear Science* (ed. A. Scott), pp. 885-887. Routledge, New York and London.
- [30] **Ricca, R.L.** (2005) Inflexional disequilibrium of magnetic flux tubes. *Fluid Dyn. Res.* **36**, 319-332.
- [31] Maggioni, F. & **Ricca, R.L.** (2006) Writhing and coiling of closed filaments. *Proc. R. Soc. A* **462**, 3151-3166.
- [32] Maggioni, F. & **Ricca, R.L.** (2006) Twist and fold modeling of supercoiled filaments. In *Aplimat '06* (ed. M. Covàcovà), pp. 123-130, Slovak U. of Tech., Bratislava.
- [33] **Ricca, R.L.** & Maggioni, F. (2007) A new stretch-twist-fold model for fast dynamo. *Proc. Appl. Math. Mech.* **7**, 2100051-2100052.
- [34] Maggioni, F. & **Ricca, R.L.** (2007) DNA supercoiling modeling of nucleosome and viral spooling. *Proc. Appl. Math. Mech.* **7**, 2120011-2120012.
- [35] **Ricca, R.L.** (2008) Topology bounds energy of knots and links. *Proc. R. Soc. A* **464**, 293-300.
- [36] **Ricca, R.L.** & Maggioni, F. (2008) Multiple folding and packing in DNA modeling. *Comp. & Math. with Appl.* **55**, 1044-1053.
- [37] **Ricca, R.L.** (2008) Momenta of a vortex tangle by structural complexity analysis. *Physica D* **237**, 2223-2227.

- [38] **Ricca, R.L.** (2009) Structural complexity and dynamical systems. In *Lectures on Topological Fluid Mechanics* (ed. R.L. Ricca), pp. 169-188. Springer-CIME Lecture Notes in Mathematics **1973**. Springer-Verlag.
- [39] **Ricca, R.L.** (2009) Detecting structural complexity: from visiometrics to genomics and brain research. In *Mathknow* (ed. M. Emmer & A. Quarteroni), pp. 167-181. Springer-Verlag.
- [40] **Ricca, R.L.** (2009) New developments in topological fluid mechanics. *Nuovo Cimento C* **32**, 185-192.
- [41] Maggioni, F., Alamri, S.Z., Barenghi, C.F. & **Ricca, R.L.** (2009) Kinetic energy of vortex knots and unknots. *Nuovo Cimento C* **32**, 133-142.
- [42] Maggioni, F. & **Ricca, R.L.** (2009) On the groundstate energy of tight knots. *Proc. R. Soc. A* **465**, 2761-2783.
- [43] Goldstein, R.E., Moffatt, H.K., Pesci, A.I. & **Ricca, R.L.** (2010) A soap film Möbius strip changes topology with a twist singularity. *Proc. Natnl. Acad. Sci.* **107**, 21979-21984.
- [44] Maggioni, F., Alamri, S.Z., Barenghi, C.F. & **Ricca, R.L.** (2010) Velocity, energy and helicity of vortex knots and unknots. *Phys. Rev. E* **82**, 26309-26317.
- [45] **Ricca, R.L.** & Nipoti, B. (2011) Gauss' linking number revisited. *J. Knot Theory & Its Ram.*, **20**, 1325-1343.
- [46] **Ricca, R.L.** & Nipoti, B. (2011) Derivation and interpretation of the Gauss linking number. In *Introductory Lectures on Knot Theory* (ed. L.H. Kauffman, S. Lambropoulou, S. Jablan, J.H. Przytycki), pp. 482-501. Series on Knots and Everything **46**, World Scientific.
- [47] **Ricca, R.L.** (2011) Energy-complexity relations by structural complexity methods. In *Numerical Analysis and Applied Mathematics ICNAAM 2011 AIP Conf. Proc.* **1389**, 962-964.
- [48] **Ricca, R.L.** (2012) On simple energy-complexity relations for filament tangles and networks. *Complex Systems*, **20**, 195-204.
- [49] **Ricca, R.L.** (2012) Tackling fluid tangles complexity by knot polynomials. In *Numerical Analysis and Applied Mathematics ICNAAM 2012 AIP Conf. Proc.* **1479**, 646-649.
- [50] Liu, X. & **Ricca, R.L.** (2012) The Jones polynomial for fluid knots from helicity. *J. Phys. A: Math. & Theor.*, **45**, 205501.
- [51] **Ricca, R.L.** (2013) New energy and helicity lower bounds for knotted and braided magnetic fields. *Geophys. Astrophys. Fluid Dyn.*, **107**, 385-402.
- [52] **Ricca, R.L.** (2013) Impulse of vortex knots from diagram projections. In *Topological Fluid Dynamics: Theory and Applications* (ed. H.K. Moffatt *et al.*), pp. 21-28. Procedia IUTAM **7**, Elsevier.
- [53] Liu, X. & **Ricca, R.L.** (2013) Tackling fluid structures complexity by the Jones polynomial. In *Topological Fluid Dynamics: Theory and Applications* (ed. H.K. Moffatt *et al.*), pp. 175-182. Procedia IUTAM **7**, Elsevier.
- [54] Maggioni F., Alamri S.Z., Barenghi C.F. & **Ricca R.L.** (2013) Vortex knots dynamics in Euler fluids. In *Topological Fluid Dynamics: Theory and Applications* (ed. H.K. Moffatt *et al.*), pp. 29-38. Procedia IUTAM **7**, Elsevier.
- [55] **Ricca, R.L.** (2014) Structural complexity of vortex flows by diagram analysis and knot polynomials. In *How Nature Works* (ed. I. Zelinka *et al.*), pp. 81-100. Emergence, Complexity and Computation **5**. Springer-Verlag.
- [56] **Ricca, R.L.** & Liu, X. (2014) The Jones polynomial as a new invariant of topological fluid dynamics. *Fluid Dyn. Res.*, **46**, 061412.
- [57] **Ricca, R.L.** & Maggioni, F. (2014) On the groundstate energy spectrum of magnetic knots and links. *J. Phys. A: Math. & Theor.*, **47**, 205501.

- [58] Laing, C.E., **Ricca, R.L.** & Sumners, De W.L. (2015) Conservation of writhe helicity under anti-parallel reconnection. *Nature Sci. Rep.*, **5**, 9224.
- [59] Liu, X. & **Ricca, R.L.** (2015) On the derivation of the HOMFLYPT polynomial invariant for fluid knots. *J. Fluid Mech.* **773**, 34-48.
- [60] Zuccher, S. & **Ricca, R.L.** (2015) Helicity conservation under quantum reconnection of vortex rings. *Phys. Rev. E* **92**, 061001.
- [61] **Ricca, R.L.** (2016) Vortex knot cascade in polynomial skein relations. In *Numerical Analysis and Applied Mathematics ICNAAM 2015* (ed. T. Simos & C. Tsitouras), pp. 150002-1-4. AIP Conf. Proc. **1738**, AIP Publishing.
- [62] Liu, X. & **Ricca, R.L.** (2016) Knots cascade detected by a monotonically decreasing sequence of values. *Nature Sci. Rep.* **6**, 24118.
- [63] Oberti, C. & **Ricca, R.L.** (2016) On torus knots and unknots. *J. Knot Theory & Its Ramif.* **25**, 1650036.
- [64] Oberti, C. & **Ricca, R.L.** (2017) Induction effects of torus knots and unknots. *J. Phys. A: Math. & Theor.* **50**, 365501.
- [65] Zuccher, S. & **Ricca, R.L.** (2017) Relaxation of twist helicity in the cascade process of linked quantum vortices. *Phys. Rev. E* **95**, 053109.
- [66] **Ricca, R.L.** & Liu, X. (2018) HOMFLYPT polynomial is the best quantifier for topological cascades of vortex knots. *Fluid Dyn. Res.* **50**, 011404.
- [67] Oberti, C. & **Ricca, R.L.** (2018) Energy and helicity of magnetic torus knots and braids. *Fluid Dyn. Res.* **50**, 011413.
- [68] Zuccher, S. & **Ricca, R.L.** (2018) Twist effects in quantum vortices and phase defects. *Fluid Dyn. Res.* **50**, 011414.
- [69] **Ricca, R.L.** & Maggioni, F. (2018) Groundstate energy spectra of knots and links: magnetic versus bending energy. In *New Directions in Geometric and Applied Knot Theory* (ed. S. Blatt, P. Reiter & A. Schikorra), pp. 276-288. OA Measure Theory, De Gruyter, Basel.
- [70] Foresti, M. & **Ricca, R.L.** (2019) Defect production by pure twist induction as Aharonov-Bohm effect. *Phys. Rev. E* **100**, 023107.
- [71] Oberti, C. & **Ricca, R.L.** (2019) Influence of winding number on vortex knots dynamics. *Nature Sci. Rep.* **9**, 17284.
- [72] Zuccher, S. & **Ricca, R.L.** (2019) Momentum of vortex tangles by weighted area information. *Phys. Rev. E* **100**, 011101(R).
- [73] Foresti, M. & **Ricca, R.L.** (2020) Hydrodynamics of a quantum vortex in the presence of twist. *J. Fluid Mech.* **904**, A25 [2022 Corrigendum. **938**, E1].
- [74] Guan, H., Zuccher, S., **Ricca, R.L.** & Liu, X. (2020) Topological fluid mechanics and its new developments. *Scientia Sinica Phys. Mech. Astron.* **50**, 054701.
- [75] Liu, X., **Ricca, R.L.** & Li, X-F. (2020) Minimal unlinking pathways as geodesics in knot polynomial space. *Nature Comm. Physics* **3**, 136.
- [76] Sumners, De W.L., Cruz-White, I.I. & **Ricca, R.L.** (2021) Zero helicity of Seifert framed defects. *J. Phys. A: Math. Theor.* **54**, 295203.
- [77] Roitberg, A. & **Ricca, R.L.** (2021) Hydrodynamic derivation of the Gross-Pitaevskii equation in general Riemannian metric. *J. Phys. A: Math. Theor.* **54**, 315201.
- [78] Zuccher, S. & **Ricca, R.L.** (2022) Creation of quantum knots and links driven by minimal surfaces. *J. Fluid Mech.* **942**, A8.
- [79] Foresti, M. & **Ricca, R.L.** (2022) Instability of a quantum vortex by twist perturbation. *J. Fluid Mech.* **949**, A19.
- [80] Belloni, A. & **Ricca, R.L.** (2023) On the zero helicity condition for quantum vortex defects. *J. Fluid Mech.* 963, R2.

- [81] **Ricca, R.L.** & Liu, X. (2023) A new framework for the Jones polynomial of fluid knots. *J. Knot Theory & Its Ram.*, 2340024. Online version: <https://www.worldscientific.com/doi/10.1142/S0218216523400242>.
- [82] Tubiana, L., Alexander, G., ..., **Ricca, R.L.**, ..., Žumer, S. (2024) Topology in soft and biological matter. *Physics Reports* **1075**, 1-137.
- [83] Liu, X., **Ricca, R.L.** & Guan, H. (2024) A topological approach to vortex knots and links. In *Knotted Fields* (edited by R.L. Ricca & X. Liu), pp. 1-36. Lecture Notes in Mathematics **2344**. Springer-Verlag. Heidelberg, Germany.
- [84] **Ricca, R.L.**, Foresti, M. & Liu, X. (2024) Multi-valued potentials in topological field theory. In *Knotted Fields* (edited by R.L. Ricca & X. Liu), pp. 109-139. Lecture Notes in Mathematics **2344**. Springer-Verlag. Heidelberg, Germany.
- [85] **Ricca, R.L.** (exp. October 2024) An Introduction to Topological Vortex Dynamics. In *Advances in Mathematical Fluid Dynamics* (edited by E. Dornay), to be published. Cambridge University Press, Cambridge (UK).
- [86] **Ricca, R.L.** (exp. October 2024) Topological Fluid Dynamics. In *Encyclopedia of Mathematical Physics* (edited by I. Sati), to be published. Elsevier / Academic Press (2<sup>nd</sup> Edition).

#### Edited Volumes

- [1] **Ricca, R.L.** (2001) *An Introduction to the Geometry and Topology of Fluid Flows*. NATO ASI Series II, **47**. Kluwer. Dordrecht, The Netherlands. ISBN: 10-1402002068
- [2] **Ricca, R.L.** (2009) *Lectures on Topological Fluid Mechanics*. Springer-CIME Lecture Notes in Mathematics **1973**. Springer-Verlag. Heidelberg, Germany. ISBN: 10-9783642008368
- [3] Fukumoto, Y., **Ricca, R.L.**, Boyland, P. & Eggers, J. (2018) *IUTAM Symposium on Helicity, Structures and Singularity in Fluid and Plasma Dynamics*. Proceedings of the Symposium published as special issue of *Fluid Dynamics Research* **50**. IOP Science. ISSN: 1873-7005
- [4] Adams, C.C., Gordon, C.McA., Jones, V.F.R., Kauffman, L.H., Lambropoulou, S., Millett, K., Przytycki, J.H., **Ricca, R.L.**, Sazdanovic, R. (2019) *Knots, Low-dimensional Topology and Applications*. Proc. “Int. Conf. on Knots, Low-Dimensional Topology and Applications – Knots in Hellas 2016”. Springer-Verlag. Heidelberg, Germany. ISBN: 978-3-030-16030-2.
- [5] **Ricca, R.L.** & Liu, X. (2024) *Knotted Fields*. Lecture Notes in Mathematics **2344**. Springer Nature Switzerland.