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Vita's Essentials

Only the most significant features of his academic career are outlined; they are organized in the following categories: (i) Academic Timeline; (ii) Scientific Activity; (iii) Distinctions; (iv) Editorial Service; (v) Metrics.

Academic Timeline

- 1983–1987 *Assistant Professor* of *Rational Mechanics* at the Faculty of Engineering, University of Pisa.
- 1987-1991 *Associate Professor* of *Mathematical Physics* at the Faculty of Sciences, University of Pavia.
- 1991-1994 *Associate Professor* of *Rational Mechanics* at the Faculty of Engineering, University of Pisa.
- 1994-1997 *Full Professor* of *Mathematical Physics* at the Faculty of Engineering, University of Naples *Federico II*.
- 1997-2021 *Full Professor* of *Rational Mechanics* at the Faculty of Engineering and Department of Mathematics, University of Pavia.
- 2021-present *Full Professor* of *Mathematical Physics* at the Department of Mathematics, University of Pavia.

Scientific Activity

His scientific activity is placed in the broad range of continuum theories of physics, resorting to both deterministic and statistical methods to cross length scales. Specifically, his most recent scientific interests mainly lie in the mathematical modelling of soft matter, including thermotropic liquid crystals and lyotropic systems, such as lipid membranes and chromonics.

He has co-authored nearly 170 scientific papers published in international journals, and two monographs: one, entitled *Variational problems for liquid crystals*, was published in 1994 by Chapman & Hall, the other, written in

collaboration with A. M. Sonnet is entitled *Dissipative ordered fluids* and was published in 2012 by Springer.

Distinctions

- In 1995, he was awarded the *Bruno Finzi* scientific prize by the *Istituto Lombardo di Scienze e Lettere*.
- In 1999, he delivered a keynote lecture at the *ICIAM99* in Edinburgh (UK) on the role of mathematical models in the industrial applications of liquid crystals.
- In 2002, he gave a general lecture at the *19th International Liquid Crystal Conference*, held in Edinburgh (UK).
- In 2007, he delivered a general lecture at the *9th European Conference on Liquid Crystals* held in Lisbon (Portugal).
- In 2011, he also gave a general lecture at the *11th European Conference on Liquid Crystals* held in Maribor (Slovenia).
- In 2013, he held the *Microsoft Fellowship* at the *Isaac Newton Institute* of Cambridge (UK), participating in the Programme on the *Mathematics of Liquid Crystals*.
- In 2016, he delivered an invited talk at the *26th International Liquid Crystal Conference* held in Kent (OH, USA).
- In 2016-2017, he joined the *Centre for PDEs and their Applications* at the *University of Oxford* (UK), where he was also *Fellow Commoner* at *Queen's College* and taught a DPhil course on the mathematical foundations of liquid crystals.
- In 2022, he gave a general lecture at the *28th International Liquid Crystal Conference* that took place in Lisbon (Portugal).
- In 2023, he presented a general lecture at the *16th European Conference on Liquid Crystals* held in Rende (CS, Italy).

Editorial Service

Since 2016 he is an Associate Editor of the *Archive for Rational Mechanics and Analysis*, a journal founded by C. Truesdell in 1957 and still striving to bring mathematical rigour into the modelling of physical phenomena.

Metrics

As of April 30th 2024, *Scopus* database lists 173 cited documents from the subject areas of Physics and Astronomy (135), Mathematics (108), Engineering (52), Materials Science (48), and Chemistry (31) (two-digit contributions only), for a total of 83 co-authors and 2,927 citations, granting an h-index of 30.

List of Selected Publications

The publications selected in this list are organized in the following categories: (i) Articles in Journals; (ii) Books; (iii) Contributions to Books; (iv) Patents.

Within each category, they are listed in reverse chronological order. A fuller full list, together with further information on both current and past teaching activity, can be retrieved from the web page https://unipv.unifind.cineca.it/get/person/005545.

Articles in Journals

[A1] A confined rod: mean field theory for hard rod-like particles. Liq. Cryst., 1–12 (2024). https://doi.org/10.1080/02678292.2024.2324338. (with J.M. Taylor, T.G. Fai, X. Zheng & P. Palffy-Muhoray)

[A2] What a twist cell experiment tells about a quartic twist theory for chromonics. Liq. Cryst., 1–12 (2024). https://doi.org/10.1080/02678292.2024.2324465. (with S. Paparini)

[A3] Inversion ring in chromonic twisted hedgehogs: theory and experiment. Liq. Cryst. (2024). https://doi.org/10.1080/02678292.2024.2313023. (with F. Ciuchi, M.P. De Santo, S. Paparini & L. Spina)

[A4] Pure measure of bending for soft plates. Soft Matter **20**, 144–151 (2024). https://doi.org/10.1039/D3SM01123B

[A5] Geometric method to determine planar anchoring strength for chromonics. Phys. Rev. E **108**, 064701 (2023). https://doi.org/10.1103/PhysRevE.108.064701. (with S. Paparini)

[A6] An elastic quartic twist theory for chromonic liquid crystals. J. Elast. (2023). https://doi.org/10.1007/s10659-022-09983-4. (with S. Paparini)

[A7] Bending and stretching in a narrow ribbon of nematic polymer networks. J. Elast. **154**, 531–553 (2023). https://doi.org/10.1007/s10659-022-09978-1. (with H. Singh)

[A8] Analytical thermodynamics. J. Elast. **153**, 787–812 (2023). https://doi.org/10.1007/s10659-023-09997-6. (with P. Podio-Guidugli)

[A9] Spiralling defect cores in chromonic hedgehogs. Liq. Cryst. **50**, 1498–1516 (2023). https://doi.org/10.1080/02678292.2023.2190626. (with S. Paparini)

[A10] Relieving nematic geometric frustration in the plane. J. Phys. A: Math. Theor. **56**, 265202 (2023). https://doi.org/10.1088/1751-8121/acd890. (with A. Pedrini)

[A11] A review on octupolar tensors. J. Phys. A: Math. Theor. **56**, 363001 (2023). https://doi.org/10.1088/1751-8121/ace712. (with G. Gaeta)

[A12] A ribbon model for nematic polymer networks. J. Elast. **153**, 613–634 (2023). https://doi.org/10.1007/s10659-022-09900-9. (with H. Singh)

[A13] Model for a photoresponsive nematic elastomer ribbon. J. Elast. (2022). https://doi.org/10.1007/s10659-022-09959-4. (with A.M. Sonnet)

[A14] Stability against the odds: The case of chromonic liquid crystals. J. Nonlinear Sci. **32**, 74 (2022). https://doi.org/10.1007/s00332-022-09833-6. (with S. Paparini)

[A15] Paradoxes for chromonic liquid crystal droplets. Phys. Rev. E **106**, 044703 (2022). https://doi.org/10.1103/PhysRevE.106.044703. (with S. Paparini)

[A16] Ericksen's secret influence. J. Elast. (2022). https://doi.org/10.1007/s10659-022-09953-w

[A17] Ridge energy for thin nematic polymer networks. Eur. Phys. J. E **44**, 7 (2021). https://doi.org/10.1140/epje/s10189-021-00012-1. (with A. Pedrini)

[A18] On the Kirchhoff-Love hypothesis (Revised and vindicated). J. Elast. **143**, 359–384 (2021). https://doi.org/10.1007/s10659-021-09819-7. (with O. Ozenda)

[A19] Nematic tactoid population. Phys. Rev. E **103**, 022707 (2021). https://doi.org/10.1103/PhysRevE.103.022707. (with S. Paparini)

[A20] Leaky cell model of hard spheres. J. Chem. Phys. **154**, 104505 (2021). https://doi.org/10.1063/5.0037442. (with T.G. Fai, J.M. Taylor, X. Zheng & P. Palffy-Muhoray)

[A21] Ridge approximation for thin nematic polymer networks. J. Appl. Phys. **129**, 184701 (2021). https://doi.org/10.1063/5.0045070. (with A. Pedrini)

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[A23] Cavity volume and free energy in many-body systems. J. Nonlinear Sci. **31**, 87 (2021). https://doi.org/10.1007/s00332-021-09744-y. (with J.M. Taylor, T. G. Fai, X. Zheng & P. Palffy-Muhoray)

[A24] Shape bistability in 2d chromonic droplets. J. Phys. Condens. Matter **33**(49), 495101 (2021). https://doi.org/10.1088/1361-648X/ac2645. (with S. Paparini)

[A25] Liquid crystal distortions revealed by an octupolar tensor. Phys. Rev. E **101**, 012703 (2020). https://doi.org/10.1103/PhysRevE.101.012703. (with A. Pedrini)

[A26] A blend of stretching and bending in nematic polymer networks. Soft Matter **16**, 8877–8892 (2020). https://doi.org/10.1039/D0SM00642D. (with O. Ozenda & A.M. Sonnet)

[A27] Uniform distortions and generalized elasticity of liquid crystals. Phys. Rev. E **100**(5), 052701 (2019). https://doi.org/10.1103/PhysRevE.100.052701

[A28] On a paradox in the impact dynamics of smooth rigid bodies. Math. Mech. Solids **24**, 573–597 (2019). https://doi.org/10.1177/1081286517751262. (with P. Palffy-Muhoray, M. Wilkinson & X. Zheng)

[A29] Normal red blood cells' shape stabilized by membrane's in-plane ordering. Sci. Reports **9**, 19742 (2019). https://doi.org/10.1038/s41598-019-56128-0. (with L. Mesarec, W. Góźdź, A. Iglič, V. Kralj-Iglič & S. Kralj)

[A30] Non-monotonic, lily-like twist distribution in toroidal nematics. Soft Matter **15**, 633–641 (2019). https://doi.org/10.1039/c8sm02177e. (with A. Pedrini & M. Piastra)

[A31] The symmetries of octupolar tensors. J. Elast. **135**, 295–350 (2019). https://doi.org/10.1007/s10659-018-09722-8. (with G. Gaeta)

[A32] Scientific life and works of Walter Noll. J. Elast. **135**, 3–72 (2019). https://doi.org/10.1007/s10659-019-09728-w. (with P. Podio-Guidugli)

[A33] Octupolar tensors for liquid crystals. J. Phys. Math. Theor. **51**(2), 025206 (2018). https://doi.org/10.1088/1751-8121/aa98a8. (with Y. Chen & L. Qi)

[A34] Contributions of repulsive and attractive interactions to nematic order. Liq. Cryst. **45**(13-15), 2352–2360 (2018). https://doi.org/10.1080/02678292.2018.1516823. (with P. Palffy-Muhoray, J.M. Taylor & X. Zheng)

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[A42] Octupolar order in three dimensions. Eur. Phys. J. E **39**(11), 113 (2016). https://doi.org/10.1140/epje/i2016-16113-7. (with G. Gaeta)

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[A53] Dissipative shocks in a chain fountain. Phys. Rev. E **89**(5), 053201 (2014). https://doi.org/10.1103/PhysRevE.89.053201

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[A67] Minimum principle for indefinite mean-field free energies. Arch. Ration. Mech. Anal. **196**(1), 143–189 (2010). https://doi.org/10.1007/s00205-009-0238-5. (with E.C. Gartland, Jr.)

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