

Adekoya, Oreoluwa; Albert, John P.

Maximisers for Strichartz inequalities on the torus. (English) Zbl 1479.35026
Nonlinearity 35, No. 1, 311-342 (2022).

MSC:

- 35A23 Inequalities applied to PDEs involving derivatives, differential and integral operators, or integrals
- 35A15 Variational methods applied to PDEs
- 35Q41 Time-dependent Schrödinger equations and Dirac equations
- 35Q55 NLS equations (nonlinear Schrödinger equations)
- 35Q60 PDEs in connection with optics and electromagnetic theory
- 49J20 Existence theories for optimal control problems involving partial differential equations
- 78A60 Lasers, masers, optical bistability, nonlinear optics

Keywords:

maximisers for variational problems; recompactness of maximising sequences; optical pulses in dispersion-managed fibers

Full Text: [DOI](#) [arXiv](#)

References:

- [1] Ablowitz, M. J.; Biondini, G., Multiscale pulse dynamics in communication systems with strong dispersion management, *Opt. Lett.*, 23, 1668-1670 (1998) · [doi:10.1364/ol.23.001668](#)
- [2] Adekoya, O., Periodic solutions of the dispersion-managed nonlinear Schrödinger equation, PhD Thesis (2019)
- [3] Bennett, J.; Bez, N.; Carbery, A.; Hundertmark, D., Heat-flow monotonicity of Strichartz norms, *Anal. PDE*, 2, 147-158 (2009) · [Zbl 1190.35043](#) · [doi:10.2140/apde.2009.2.147](#)
- [4] Bourgain, J., Fourier transform restriction phenomena for certain lattice subsets and applications to nonlinear evolution equations, *Geom. Funct. Anal.*, 3, 107-156 (1993) · [Zbl 0787.35097](#) · [doi:10.1007/bf01896020](#)
- [5] Carneiro, E., A sharp inequality for the Strichartz norm (2008)
- [6] Carneiro, E.; Oliveira e. Silva, D., *Int. Math. Res. Not.*, 2015, 8233-8267 (2015) · [Zbl 1325.42008](#) · [doi:10.1093/imrn/rnu194](#)
- [7] Carneiro, E.; Oliveira e. Silva, D.; Sousa, M.; Stovall, B., Extremizers for adjoint Fourier restriction on hyperboloids: the higher dimensional case, *Indiana Univ. Math. J.*, 70, 535-559 (2021) · [Zbl 1466.42006](#) · [doi:10.1512/iumj.2021.70.8323](#)
- [8] Cazenave, T., *Semilinear Schrödinger Equations* (2003), Providence, RI: American Mathematical Society, Providence, RI · [Zbl 1055.35003](#)
- [9] Cazenave, T.; Lions, P. L., Orbital stability of standing waves for some nonlinear Schrödinger equations, *Commun. Math. Phys.*, 85, 549-561 (1982) · [Zbl 0513.35007](#) · [doi:10.1007/bf01403504](#)
- [10] Choi, M-R; Hundertmark, D.; Lee, Y-R, Thresholds for existence of dispersion management solitons for general nonlinearities, *SIAM J. Math. Anal.*, 49, 1519-1569 (2017) · [Zbl 1432.35184](#) · [doi:10.1137/15m103666x](#)
- [11] Christ, F. M.; Shao, S., Existence of extremals for a Fourier restriction inequality, *Anal. PDE*, 5, 261-312 (2012) · [Zbl 1273.42009](#) · [doi:10.2140/apde.2012.5.261](#)
- [12] Erdoğan, M.; Hundertmark, D.; Lee, Y., Exponential decay of dispersion managed solitons for vanishing average dispersion, *Math. Res. Lett.*, 18, 11-24 (2011) · [Zbl 1239.35021](#) · [doi:10.4310/MRL.2011.v18.n1.a2](#)
- [13] Fanelli, L.; Vega, L.; Visciglia, N., On the existence of maximisers for a family of restriction theorems, *Bull. Lond. Math. Soc.*, 43, 811-817 (2011) · [Zbl 1225.42012](#) · [doi:10.1112/blms/bdr014](#)
- [14] Foschi, D., Maximisers for the Strichartz inequality, *J. Eur. Math. Soc.*, 9, 739-774 (2007) · [Zbl 1231.35028](#) · [doi:10.4171/jems/95](#)
- [15] Foschi, D., Global maximisers for the sphere adjoint Fourier restriction inequality, *J. Funct. Anal.*, 268, 690-702 (2015) · [Zbl 1311.42019](#) · [doi:10.1016/j.jfa.2014.10.015](#)
- [16] Foschi, D.; Oliveira e. Silva, D., Some recent progress on sharp Fourier restriction theory, *Anal. Math.*, 43, 241-265 (2017) · [Zbl 1389.42016](#) · [doi:10.1007/s10476-017-0306-2](#)
- [17] Frank, R. L.; Lieb, E. H.; Seiringer, R., Maximisers for the Stein-Tomas inequality, *Geom. Funct. Anal.*, 26, 1095-1134 (2016) · [Zbl 1357.42023](#) · [doi:10.1007/s00039-016-0380-9](#)
- [18] Frank, R. L.; Seiringer, R., Extremizers for the Airy-Strichartz inequality, *Math. Ann.*, 372, 1121-1166 (2018) · [Zbl 1406.35354](#)

[doi:10.1007/s00208-018-1695-7](https://doi.org/10.1007/s00208-018-1695-7)

- [19] Gabitov, I. R.; Turitsyn, S. K., Averaged pulse dynamics in a cascaded transmission system with passive dispersion compensation, *Opt. Lett.*, 21, 327-329 (1996) · [doi:10.1364/ol.21.000327](https://doi.org/10.1364/ol.21.000327)
- [20] Green, W. R.; Hundertmark, D., Exponential decay of dispersion-managed solitons for general dispersion profiles, *Lett. Math. Phys.*, 106, 221-249 (2016) · [Zbl 1333.35261](https://zbmath.org/journal/1333.35261) · [doi:10.1007/s11005-015-0811-9](https://doi.org/10.1007/s11005-015-0811-9)
- [21] Hundertmark, D.; Kunstmann, P.; Schnaubelt, R., Stability of dispersion managed solitons for vanishing average dispersion, *Arch. Math.*, 104, 283-288 (2015) · [Zbl 1311.35287](https://zbmath.org/journal/1311.35287) · [doi:10.1007/s00013-015-0731-z](https://doi.org/10.1007/s00013-015-0731-z)
- [22] Hundertmark, D.; Lee, Y-R, Decay estimates and smoothness for solutions of the dispersion managed nonlinear Schrödinger equation, *Commun. Math. Phys.*, 286, 851-873 (2009) · [Zbl 1173.35686](https://zbmath.org/journal/1173.35686) · [doi:10.1007/s00220-008-0612-4](https://doi.org/10.1007/s00220-008-0612-4)
- [23] Hundertmark, D.; Lee, Y-R, On non-local variational problems with lack of compactness related to nonlinear optics, *J. Nonlinear Sci.*, 22, 1-38 (2012) · [Zbl 1244.49008](https://zbmath.org/journal/1244.49008) · [doi:10.1007/s00332-011-9106-1](https://doi.org/10.1007/s00332-011-9106-1)
- [24] Hundertmark, D.; Lee, Y-R; Ried, T.; Zharnitsky, V., Solitary waves in nonlocal NLS with dispersion averaged saturated nonlinearities, *J. Differ. Equ.*, 265, 3311-3338 (2018) · [Zbl 1395.35173](https://zbmath.org/journal/1395.35173) · [doi:10.1016/j.jde.2017.08.028](https://doi.org/10.1016/j.jde.2017.08.028)
- [25] Hundertmark, D.; Zharnitsky, V., On sharp Strichartz inequalities in low dimensions, *Int. Math. Res. Not.*, 18, 34080 (2006) · [Zbl 1131.35308](https://zbmath.org/journal/1131.35308) · [doi:10.1155/imrn/2006/34080](https://doi.org/10.1155/imrn/2006/34080)
- [26] Jiang, J-C; Shao, S., On characterization of the sharp Strichartz inequality for the Schrödinger equation, *Anal. PDE*, 9, 353-361 (2016) · [Zbl 1341.35024](https://zbmath.org/journal/1341.35024) · [doi:10.2140/apde.2016.9.353](https://doi.org/10.2140/apde.2016.9.353)
- [27] Kenig, C.; Ponce, G.; Vega, L., The Cauchy problem for the Korteweg-de Vries equation in Sobolev spaces of negative indices, *Duke Math. J.*, 71, 1-21 (1993) · [Zbl 0787.35090](https://zbmath.org/journal/0787.35090) · [doi:10.1215/s0012-7094-93-07101-3](https://doi.org/10.1215/s0012-7094-93-07101-3)
- [28] Kunze, M., On the existence of a maximiser for the Strichartz inequality, *Commun. Math. Phys.*, 243, 137-162 (2003) · [Zbl 1060.35133](https://zbmath.org/journal/1060.35133) · [doi:10.1007/s00220-003-0959-5](https://doi.org/10.1007/s00220-003-0959-5)
- [29] Kunze, M., On a variational problem with lack of compactness related to the Strichartz inequality, *Calc. Var. Partial Differ. Equ.*, 19, 307-336 (2004) · [Zbl 1352.49002](https://zbmath.org/journal/1352.49002) · [doi:10.1007/s00526-003-0218-9](https://doi.org/10.1007/s00526-003-0218-9)
- [30] Kunze, M.; Moeser, J.; Zharnitsky, V., Ground states for the higher-order dispersion managed NLS equation in the absence of average dispersion, *J. Differ. Equ.*, 209, 77-100 (2005) · [Zbl 1072.35169](https://zbmath.org/journal/1072.35169) · [doi:10.1016/j.jde.2004.09.014](https://doi.org/10.1016/j.jde.2004.09.014)
- [31] Lions, P.; Lions, P., The concentration-compactness principle in the calculus of variations. The locally compact case, part 1. The concentration-compactness principle in the calculus of variations. The locally compact case, part 2, *Ann. Inst. Henri Poincaré C. Ann. Inst. Henri Poincaré C*, 1, 223-283 (1984) · [Zbl 0704.49004](https://zbmath.org/journal/0704.49004) · [doi:10.1016/s0294-1449\(16\)30422-x](https://doi.org/10.1016/s0294-1449(16)30422-x)
- [32] Nahmod, A., The nonlinear Schrödinger equation on tori: integrating harmonic analysis, geometry, and probability, *Bull. Am. Math. Soc.*, 53, 57-91 (2016) · [Zbl 1328.35214](https://zbmath.org/journal/1328.35214) · [doi:10.1090/bull/1516](https://doi.org/10.1090/bull/1516)
- [33] Oliveira e Silva, D.; Quilodrán, R., Global maximisers for adjoint Fourier restriction inequalities on low dimensional spheres, *J. Funct. Anal.*, 280 (2021) · [Zbl 1458.35011](https://zbmath.org/journal/1458.35011) · [doi:10.1016/j.jfa.2020.108825](https://doi.org/10.1016/j.jfa.2020.108825)
- [34] Segal, I., Space-time decay for solutions of wave equations, *Adv. Math.*, 22, 305-311 (1976) · [Zbl 0344.35058](https://zbmath.org/journal/0344.35058) · [doi:10.1016/0001-8708\(76\)90097-9](https://doi.org/10.1016/0001-8708(76)90097-9)
- [35] Shao, S., Maximisers for the Strichartz and the Sobolev-Str, ichtartz inequalities for the Schrödinger equation, *Electron. J. Differ. Equ.*, 2009, 1-13 (2009)
- [36] Shao, S., On existence of extremizers for the Tomas-Stein inequality for S^1 , *J. Funct. Anal.*, 270, 3996-4038 (2016) · [Zbl 1339.42011](https://zbmath.org/journal/1339.42011) · [doi:10.1016/j.jfa.2016.02.019](https://doi.org/10.1016/j.jfa.2016.02.019)
- [37] Stanislavova, M., Regularity of ground state solutions of dispersion managed nonlinear Schrödinger equations, *J. Differ. Equ.*, 210, 87-105 (2005) · [Zbl 1072.35172](https://zbmath.org/journal/1072.35172) · [doi:10.1016/j.jde.2004.10.006](https://doi.org/10.1016/j.jde.2004.10.006)
- [38] Stein, E., Oscillatory integrals in Fourier analysis, *Beijing Lectures in Harmonic Analysis*, 307-355 (1986), Princeton, NJ: Princeton University Press, Princeton, NJ
- [39] Stovall, B., Extremizability of Fourier restriction to the paraboloid, *Adv. Math.*, 360 (2020) · [Zbl 1429.42011](https://zbmath.org/journal/1429.42011) · [doi:10.1016/j.aim.2019.106898](https://doi.org/10.1016/j.aim.2019.106898)
- [40] Strichartz, R., Restriction of Fourier transform to quadratic surfaces and decay of solutions of wave equations, *Duke Math. J.*, 44, 705-774 (1977) · [Zbl 0372.35001](https://zbmath.org/journal/0372.35001) · [doi:10.1215/s0012-7094-77-04430-1](https://doi.org/10.1215/s0012-7094-77-04430-1)
- [41] Tao, T.; Brandolini, L.; Colzani, L.; Travaglini, G.; Iosevich, A., Some recent progress on the restriction conjecture, *Fourier Analysis and Convexity*, 217-243 (2004), Boston, MA: Birkhäuser, Boston, MA
- [42] Tao, T., *Nonlinear Dispersive Equations: Local and Global Analysis* (2006), Providence, RI: American Mathematical Society, Providence, RI · [Zbl 1106.35001](https://zbmath.org/journal/1106.35001)
- [43] Tomas, P. A., A restriction theorem for the Fourier transform, *Bull. Am. Math. Soc.*, 81, 477-478 (1975) · [Zbl 0298.42011](https://zbmath.org/journal/0298.42011) · [doi:10.1090/s0002-9904-1975-13790-6](https://doi.org/10.1090/s0002-9904-1975-13790-6)
- [44] Zharnitsky, V.; Grenier, E.; Turitsyn, S. K.; Jones, C. K R. T.; Hesthaven, J. S., Ground states of dispersion-managed nonlinear Schrödinger equation, *Phys. Rev. E*, 62, 7358-7364 (2000) · [doi:10.1103/physreve.62.7358](https://doi.org/10.1103/physreve.62.7358)
- [45] Zygmund, A., On Fourier coefficients and transforms of functions of two variables, *Stud. Math.*, 50, 189-201 (1974) · [Zbl 0278.42005](https://zbmath.org/journal/0278.42005) · [doi:10.4064/sm-50-2-189-201](https://doi.org/10.4064/sm-50-2-189-201)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original paper as accurately as possible without claiming the completeness or perfect precision of the matching.