

List of Symbols

Symbol		page
min : minimum		1
inf : infimum		3
Sup : Supremum		3
max : maximum		7
Re : Real		10
Im : Imaginary		10
det : determinant		38
arg : argument		52
L^P : Lebesgue Space		53
L^∞ : Lebesgue Space		63
L^2 : Hilbert Space		63
diam : diameter		73
\otimes : Tenser product		76
rad : radial		137
kGZ : Klein - Gordon -Zakharov		144
H^1 : Sobolev		150
NLKG : nonlinear Klein–Gordon equations		178
NLS : nonlinear Schrödinger equations		178
Dom : Domain		202
mod : modulo		226
a.s : almost Sure		253

References

- [1] Martin Bohner, Stephen Clark and Jerry Ridenhour, Lyapunov Inequalities for Time Scales, *J. of Inequal. & Appl.*, 2002, Vol. 7(1), pp. 61-77.
- [2] Chen, S. (1991). Lyapunov inequalities for differential and difference equations. *Fasc. Math.*, 23, 25-41.
- [3] Hilger, S. (1990). Analysis on measure chains a unified approach to continuous and discrete calculus. *Results Math.*, 18, 18-56.
- [4] Lyapunov, A. M. (1907). *Problème général de la stabilité du mouvement. „Inn. Fae. Sei. Toulouse Math.*, 9, 203-474.
- [5] Agarwal, R. P., *Difference Equations and Inequalities*. Marcel Dekker, Inc., New York, 1992.
- [6] Coppel, W. A., *Disconjugacy*, Lecture Notes No. 220. Springer-Verlag, Berlin, 1971.
- [7] Clark, S. and Hinton, D. B. (1999). Discrete Lyapunov inequalities. *Dynam. Systems Appl.*, 8(3,4), 369-380. Special Issue on "Discrete and Continuous Hamiltonian Systems", Edited by Agarwal, R. P. and Bohner, M.
- [8] Aulbach, B. and Hilger, S., Linear dynamic processes with inhomogeneous time scale. In: *Nonlinear Dynamics and Quantum Dynamical Systems*, Akademie Verlag, Berlin, 1990.
- [9] Hilger, S. (1999). Special functions, Laplace and Fourier transform on measure chains. *Dynam. Systems Appl.*, 8(3,4), 471-488. Special Issue on "Discrete and Continuous Hamiltonian Systems", Edited by Agarwal, R. P. and Bohner, M.
- [10] Kaymakçalan, B., Lakshmikantham, V. and Sivasundaram, S., *Dynamic Systems on Measure Chains*, Kluwer Academic Publishers, Boston, 1996.
- [11] Agarwal, R. P. and Bohner, M. (1999). Basic calculus on time scales and some of its applications. *Results Math.*, 35(1,2), 3-22.
- [12] Ahlbrandt, C. D., Bohner, M. and Ridenhour, J. (2000). Hamiltonian systems on time scales. *J. Math. Anal. Appl.*, 250, 561- 578.
- [13] Bohner, M. and Lutz, D. A. (1999). Asymptotic behavior of dynamic equations on time scales. *J. Differ. Equations Appl.*, To appear.

- [14] Dogšlý, O. and Hilscher, R. (2000). Disconjugacy, transformations and quadratic functionals for symplectic dynamic systems on time scales. *J. Differ. Equations Appl.*, To appear.
- [15] Agarwal, R. P. and Bohner, M. (1998). Quadratic functionals for second order matrix equations on time scales. *Nonlinear Anal.*, 33, 675-692.
- [16] Ahlbrandt, C. D. and Peterson, A. C., *Discrete Hamiltonian Systems: Difference Equations, Continued Fractions, and Riccati Equations*, Kluwer Academic Publishers, Boston, 1996.
- [17] Kratz, W., *Quadratic Functionals in Variational Analysis and Control Theory*. Akademie Verlag, Berlin, 1995.
- [18] Clark, S. and Hinton, D. B. (1998). A Lyapunov inequality for linear Hamiltonian systems. *Math. Inequal. Appl.*, 1(2), 201-209.
- [19] Peterson, A. and Ridenhour, J. (1992). A disconjugacy criterion of W. T. Reid for difference equations. *Proc. Amer. Math. Soc.*, 114(2), 459-468.
- [20] Horn, R. A. and Johnson, C. R., *Matrix Analysis*, Cambridge University Press, Cambridge 1991).
- [21] Hilscher, R. (2000). Linear Hamiltonian systems on time scales: Positivity of quadratic functionals. *Math. Comput. Modelling*, 32(5,6), 507-527.
- [22] Hilscher, R. (2000). Positivity of quadratic functionals on time scales: Necessity. *Math. Nachr.*, To appear.
- [23] G. SH. GUSEINOV, B. KAYMAKCALAN, Lyapunov inequalities for discrete linear Hamiltonian systems, *Computers and Mathematics with Applications* 45 (2003) 1399-1416
- [24] M.G. Krein, Foundations of the theory of X-zones of stability of a canonical system of linear differential equations with periodic coefficients, In Memory of A. A. Andronov, Itdat. Akad. Nauk SSSR (Moscow), 413-498, (1955); *Amer. Math. Sm. Translations, Ser. 2* 120, I-70, (1983).
- [25] V.A. Yakubovich and V.M. Starzhinsky, *Linear Differential Equations with Periodic Coefficients*, Parts I and II, Wiley, New York, (1975).
- [26] S.S. Cheng, Lyapunov inequalities for differential and difference equations, *&SC. Math.* 23, 25-41, (1991).

- [27] R. Agarwal, C.D. Ahlbrandt, M. Bohner and A.C. Peterson, Discrete linear Hamiltonian systems: A survey, *Dynam. Systems Appl.* 8, 307-333, (1999).
- [28] L. Erbe and P. Yan, Disconjugacy for linear Hamiltonian difference systems, *J. Math. Anal. Appl.* 167, 355-367, (1992).
- [29] P. Hartman, Difference equations: Disconjugacy, principal solutions, Green's functions, complete monotonicity, *Trans. Amer. Math. Soc.* 246, I-30, (1978).
- [30] M. Bohner, Linear Hamiltonian difference systems: Disconjugacy and Jacobi-type conditions, *J. Math. Anal. Appl.* 199, 804-826, (1996). 11. M. Bohner, S. Clark and J.
- [31] C.D. Ahlbrandt and A.C. Peterson, Discrete Hamiltonian Systems: Difference Equations, Continued Functions, and Riccati Equations, Kluwer Academic, Boston, MA, (1996).
- [32] S.N. Elaydi, An Introduction to Difference Equations, Springer-Verlag, New York, (1996).
- [33] Fu-Hsiang Wong, Shueh-Ling Yu, Cheh-Chih Yeh, Wei-Cheng Lian, Lyapunov's inequality on timescales, *Applied Mathematics Letters* 19 (2006) 1293–1299
- [34] R.P. Agarwal, M. Bohner, A. Peterson, Inequalities on time scales: A survey, *Math. Inequal. Appl.* 4 (2001) 535–557.
- [35] A.M. Lyapunov, Problème général de stabilité du mouvement, *Ann. Fac. Sci. Toulouse Math.* 9 (1907) 203–474.
- [36] S.B. Eliason, Comparison theorems for second order nonlinear differential equations, *Auart. Appl. Math.* 35 (1971) 148–156.
- [37] M. Bohner, S. Clark, J. Ridenhour, Lyapunov inequalities for time scales, *J. Inequal. Appl.* 7 (2002) 61–77.
- [38] S. Hilger, Analysis on measure chains—a unified approach to continuous and discrete calculus, *Results Math.* 18 (1990) 18–56.
- [39] B. Kaymakcalan, V. Lakshmikantham, S. Sivasundaram, Dynamic Systems on Measure Chains, Kluwer Academic Publishers, Dordrecht, 1996.
- [40] M. Bohner, A. Peterson, Dynamic Equations on Time Scales, Birkhäuser, Boston, Basel, Berlin, 2001.
- [41] Jalal Shatah, Stable Standing Waves of Nonlinear Klein-Gordon Equations, *Commun. Math. Phys.* 91, 313-327 (1983)

- [42] Strauss, W.A.: Existence of solitary waves in higher dimensions. *Commun. Math. Phys.* 55, 149 (1977)
- [43] Berestycki, H., Lions, P.: *Arch. Rat. Mech. Anal.* (1983)
- [44] Lee, T.D.: *Particle physics and introduction to field theory*. New York: Harwood Academic Publishers 1981
- [45] Anderson, D.L.T.: *J. Math. Phys.* 12, 945-952 (1971)
- [46] Shatah, J.M.: Unstable ground state and standing waves of nonlinear Klein-Gordon equations (to appear)
- [47] Berestycki, H., Cazenave, T.: Instabilite des etats stationnaires dans les equations de Schrodinger et de Klein-Gordon, non lineaires. *C. R. Acad. Sci.* 293A, 489-492 (1981)
- [48] Cazenave, T., Lions, P.L.: Orbital stability of standing waves for some nonlinear Schrodinger equations. *Commun. Math. Phys.* 85, 549-561 (1982)
- [49] Lions, P.L.: Principle de concentration - compacite en calcul des variations. *C. R. Acad. Sci. Paris* 294, 261-264 (1982)
- [50] Strauss, W.A.: *Anais. Acad. Bras. Cienc.* 42, 645-651 (1970)
- [51] Xiao-Song Yang, Liapunov Asymptotic Stability and Zhukovskij Asymptotic Stability, *Chaos, Solitons and Fractals* 11 (2000) 1995-1999
- [52] Hahn W. *Stability of motion*. Berlin: Springer, 1967.
- [53] Leonov GA, Ponomarenko DV, Smirnova VB. Local instability and localization of attractors from stochastic generator to chua's systems. *Acta Appl Math* 1995;40:179-243.
- [54] Liapunov AM. *The general problem of the stability of motion*, Kharkov, vol. 1892. Princeton: Princeton University Press, 1947.
- [55] Poincaré H. *Memoire sur les corbes definies par les equations differentielles*. *J Math Pures Appl Sér* 1886;4(2).
- [56] Zhukovskij NE. On solidity of motion. In: *Collection of works*, vol. 1. Moscow: Leningrad Press, 1948:67-1.
- [57] Jackson EA. *Perspectives of nonlinear dynamics*, vol. 1. Cambridge: Cambridge University Press, 1989.
- [58] Liao X. *Mathematical theory and application of stability*. Wuhan, China: Central China Normal University Press, 1988.

- [59] Palis Jr. J, de Melo W. Geometric theory of dynamical systems. New York: Springer, 1982.
- [60] Nicolas Privault, Moment identities for Skorohod integrals on the Wiener space and applications, Mathematics Subject Classification (1991): 60H07, 60G30.
- [61] A.S. Üstünel and M. Zakai. Random rotations of the Wiener path. *Probab. Theory Relat. Fields*, 103(3):409-429, 1995.
- [62] D. Nualart, The Malliavin calculus and related topics. Probability and its Applications. Springer- Verlag, Berlin, second edition, 2006.
- [63] S. Watanabe. Lectures on Stochastic Di_erential Equations and Malliavin Calculus. Tata Institute of Fundamental Research, 1984.
- [64] A.V. Skorokhod. On a generalization of a stochastic integral. *Theor. Probab. Appl.*, XX:219-233, 1975.
- [65] Nicolas Privault, Random Hermite Polynomials and Girsanov Identities on the Wiener Space, Mathematics Subject Classification: 60H07, 60G30. October 20, 2010
- [66] A. Segall and T. Kailath. Orthogonal functionals of independent-increment processes. *IEEE Trans. Information Theory*, IT-22(3):287-298, 1976.
- [67] P.A. Meyer. Un cours sur les intégrales stochastiques. In Séminaire de Probabilités, X (Seconde partie: Théorie des intégrales stochastiques, Univ. Strasbourg, Strasbourg, année universitaire 1974/1975), pages 245-400. Lecture Notes in Math., Vol. 511, Berlin, 1976. Springer. Available at http://www.numdam.org/numdam-bin/item?id=SPS_1976__10__245_0.
- [68] A.S. Üstünel and M. Zakai. Random rotations of the Wiener path. *Probab. Theory Relat. Fields*, 103(3):409-429, 1995.
- [69] N. Privault. Moment identities for Skorohod integrals on the Wiener space and applications. *Electron. Commun. Probab.*, 14:116-121 (electronic), 2009.
- [70] A.S. Üstünel and M. Zakai. Transformation of measure on Wiener space. Springer Monographs in Mathematics. Springer-Verlag, Berlin, 2000.
- [71] H.H. Kuo. White Noise Distribution Theory. Probability and Stochastics Series. CRC Press, 1996.
- [72] S. Watanabe. Lectures on Stochastic Differential Equations and Malliavin Calculus. Tata Institute of Fundamental Research, 1984.

- [73] Liqun Jiang, Zhan Zhou, Lyapunov inequality for linear Hamiltonian systems on time scales, *J. Math. Anal. Appl.* 310 (2005) 579–593
- [74] S. Hilger, Analysis on measure chain—A unified approach to continuous and discrete calculus, *Results Math.* 18 (1990) 18–56.
- [75] R. Agarwal, M. Bohner, P. Rehak, Half-linear dynamic equations, *Nonlinear Anal. Appl.*, in press.
- [76] Z. He, Existence of two solutions of m -point boundary value problem for second order dynamic equations on time scales, *J. Math. Anal. Appl.* 296 (2004) 97–109.
- [77] R. Hilscher, Reid roundabout theorem for symplectic systems on time scales, *Appl. Math. Optim.* 43 (2001) 129–146.
- [78] S. Saker, Oscillation of nonlinear dynamic equations on time scales, *Appl. Math. Comput.* 148 (2004) 81–91.
- [79] R. Agarwal, M. Bohner, D. O'Regan, A. Peterson, Dynamic equations on time scales: A survey, *J. Comput. Appl. Math.* 141 (2002) 1–26.
- [80] M. Bohner, A. Peterson, *Dynamic Equations on Time Scales, An Introduction with Applications*, Birkhäuser, Boston, 2001.
- [81] M. Bohner, A. Peterson, *Advances in Dynamic Equations on Time Scales*, Birkhäuser, Boston, 2002.
- [82] G. Guseinov, B. Kaymakcalan, Lyapunov inequalities for discrete linear Hamiltonian system, *Comput. Math. Appl.* 45 (2003) 1399–1416.
- [83] J. Mawhin, M. Willem, *Critical Points Theory and Hamiltonian Systems*, Springer-Verlag, Boston, 1989.
- [84] C. Ahlbrandt, A. Peterson, *Discrete Hamiltonian System: Difference Equations, Continued Fractions and Riccati Equations*, Kluwer Academic, Boston, 1996.
- [85] R. Agarwal, M. Bohner, A. Peterson, Inequalities on time scales: A survey, *Math. Inequal. Appl.* 4 (2001) 535–557.
- [86] S. Hilger, Differential and difference calculus—unified! *Nonlinear Anal.* 30 (1997) 2683–2694.
- [87] Xiaofei He, Qi-ming Zhang, Xianhua Tang, On Inequalities of Lyapunov for Linear Hamiltonian Systems on Time Scales, *J. Math. Anal. Appl.* 381 (2011) 695–705
- [88] S. Hilger EinBmakettenkalkül mit Anwendung auf Zentrumsmannigfaltigkeiten, PhD thesis, Universität Würzburg, 1988 (in German).

- [89] S. Hilger, Differential and difference calculus—unified!, *Nonlinear Anal.* 30 (1997) 2683–2694.
- [90] B. Kaymakcalan, V. Lakshmikantham, S. Sivasundaram, *Dynamic System on Measure Chains*, Kluwer Academic, Dordrecht, 1996.
- [91] M. Bohner, A. Peterson, *Advances in Dynamic Equations on Time Scales*, Birkhäuser, Boston, 2003.
- [92] C. Ahlbrandt, A. Peterson, *Discrete Hamiltonian System: Difference Equations, Continued Functions and Riccati Equations*, Kluwer Academic, Boston, 1996.
- [93] S.S. Cheng, A discrete analogue of the inequality of Lyapunov, *Hokkaido Math. J.* 12 (1983) 105–112.
- [94] G.Sh. Guseinov, B. Kaymakcalan, Lyapunov inequalities for discrete linear Hamiltonian systems, *Comput. Math. Appl.* 45 (2003) 1399–1416.
- [95] J. Mawhin, M. Willem, *Critical Points Theory and Hamiltonian Systems*, Springer-Verlag, Boston, 1989.
- [96] R. Agarwal, M. Bohner, P. Rehak, Half-linear dynamic equations, *Nonlinear Anal. Appl.* 1 (2003) 1–56.
- [97] Z. He, Existence of two solutions of m-point boundary value problem for second dynamic equations on time scales, *J. Math. Anal. Appl.* 296 (2004) 97–109.
- [98] L.Q. Jiang, Z. Zhou, Lyapunov inequality for linear Hamiltonian systems on time scales, *J. Math. Anal. Appl.* 310 (2005) 579–593.
- [99] S. Saker, Oscillation of nonlinear dynamic equations on time scales, *Appl. Math. Comput.* 148 (2004) 81–91.
- [100] Masahito Ohta, Grozdena Todorova, Strong Instability of Standing Waves for Nonlinear Klein-Gordon Equation and Klein-Gordon-Zakharov System, USA, AMS Classification: Primary 35L70; Secondary 35B35, 35A15, July 18, 2008
- [101] V. E. Zakharov, Collapse of Langmuir waves, *Sov. Phys. JETP* 35 (1972) 908–914.
- [102] L. Bergé, B. Bidégaray and T. Colin, A perturbative analysis of the time-envelope approximation in strong Langmuir turbulence, *Physica D* 95 (1996) 351–379.
- [103] R. O. Dendy, *Plasma Dynamics*, Oxford University Press, Oxford, 1990.
- [104] J. Ginibre and G. Velo, The global Cauchy problem for the non linear Klein-Gordon equation, *Math. Z.* 189 (1985) 487–505.

- [105] H. Berestycki and P. L. Lions, Nonlinear scalar field equations I, *Arch. Rat. Mech. Anal.* 82 (1983) 313–345.
- [106] W. Strauss, Existence of solitary waves in higher dimensions, *Comm. Math. Phys.* 55 (1977) 149–162.
- [107] M. K. Kwong, Uniqueness of positive solutions of $\Delta u - u + u^p = 0$ in \mathbb{R}^n , *Arch. Rational Mech. Anal.*, 105 (1989) 234–266.
- [108] J. Shatah, Stable standing waves of nonlinear Klein-Gordon equations, *Comm. Math. Phys.* 91 (1983) 313–327.
- [109] J. Shatah and W. Strauss, Instability of nonlinear bound states, *Comm. Math. Phys.* 100 (1985) 173–190.
- [110] H. Berestycki and T. Cazenave, Instabilité des états stationnaires dans les équations de Schrödinger et de Klein-Gordon non linéaires, *C. R. Acad. Sci. Paris.* 293 (1981) 489–492.
- [111] L. E. Payne and D. H. Sattinger, Saddle points and instability of nonlinear hyperbolic equations, *Israel J. Math.* 22 (1975) 273–303.
- [112] J. Shatah, Unstable ground state of nonlinear Klein-Gordon equations, *Trans. Amer. Math. Soc.* 290 (1985) 701–710.
- [113] M. Ohta and G. Todorova, Strong instability of standing waves for nonlinear Klein-Gordon equations, *Discrete Contin. Dyn. Syst.* 12 (2005) 315–322.
- [114] T. Cazenave and P. L. Lions, Orbital stability of standing waves for some nonlinear Schrödinger equations, *Comm. Math. Phys.* 85 (1982) 549–561.
- [115] M. I. Weinstein, Nonlinear Schrödinger equations and sharp interpolation estimates, *Comm. Math. Phys.* 87 (1983) 567–576.
- [116] M. Grillakis, J. Shatah and W. Strauss, Stability theory of solitary waves in the presence of symmetry, I, *J. Funct. Anal.* 74 (1987) 160–197.
- [117] M. Grillakis, J. Shatah and W. Strauss, Stability theory of solitary waves in the presence of symmetry, II, *J. Funct. Anal.* 94 (1990) 308–348.
- [118] T. Cazenave, Uniform estimates for solutions of nonlinear Klein-Gordon equations, *J. Funct. Anal.* 60 (1985) 36–55.
- [119] F. Merle and H. Zaag, Determination of the blow-up rate for the semilinear wave equation, *Amer. J. Math.* 125 (2003) 1147–1164.

- [120] H. Berestycki and P. L. Lions, Nonlinear scalar field equations II, *Arch. Rat. Mech. Anal.* 82 (1983) 347–375.
- [121] T. Ogawa and Y. Tsutsumi, Blow-up of H^1 solution for the nonlinear Schrödinger equation, *J. Differential Equation* 92 (1991) 317–330.
- [122] T. Ogawa and Y. Tsutsumi, Blow-up of H^1 solutions for the onedimensional nonlinear Schrödinger equation with critical power nonlinearity, *Proc. Amer. Math. Soc.* 111 (1991) 487–496.
- [123] F. Merle, On uniqueness and continuation properties after blow-up time of self-similar solutions of nonlinear Schrödinger equation with critical exponent and critical mass, *Comm. Pure Appl. Math.* 45 (1992) 203–254.
- [124] F. Merle, Determination of blow-up solutions with minimal mass for nonlinear Schrödinger equations with critical power, *Duke Math. J.* 69 (1993) 427–454.
- [125] F. Merle, Blow-up results of virial type for Zakharov equations, *Comm. Math. Phys.* 175 (1996) 433–455.
- [126] H. Nawa, Asymptotic profiles of blow-up solutions of the nonlinear Schrödinger equation with critical power nonlinearity, *J. Math. Soc. Japan* 46 (1994) 557–586.
- [127] H. Nawa, Asymptotic and limiting profiles of blowup solutions of the nonlinear Schrödinger equation with critical power, *Comm. Pure Appl. Math.* 52 (1999) 193–270.
- [128] T. Ozawa, K. Tsutaya and Y. Tsutsumi, Well-posedness in energy space for the Cauchy problem of the Klein-Gordon-Zakharov equations with different propagation speeds in three space dimensions, *Math. Ann.* 313 (1999) 127–140.
- [129] T. Ozawa, K. Tsutaya and Y. Tsutsumi, Normal form and global solutions for the Klein-Gordon-Zakharov equations, *Ann. Inst. Henri Poincaré, Analyse non linéaire* 12 (1995) 459–503.
- [130] K. Tsutaya, Global existence of small amplitude solutions for the Klein- Gordon-Zakharov equations, *Nonlinear Anal.* 27 (1996), 1373–1380.
- [131] Z. Gan and J. Zhang, Instability of standing waves for Klein-Gordon- Zakharov equations with different propagation speeds in three space dimesions, *J. Math. Anal. Appl.* 307 (2005) 219–231.

- [132] T. Cazenave, Semilinear Schrödinger equations, Courant Lecture Notes in Mathematics, 10. New York University, Courant Institute of Mathematical Sciences, New York; American Mathematical Society, Providence, RI, 2003.
- [133] Masaya Maeda, Stability and Instability of Standing Waves for 1-Dimensional Nonlinear Schrödinger Equation with Multiple-Power Nonlinearity, M. MAEDAKODAI MATH. J. 31 (2008), 263–271
- [134] T. Cazenave and F. B. Weissler, The Cauchy problem for the nonlinear Schrödinger equation in H^1 , Manuscripta Math. 61 (1988), 477–494.
- [135] J. Ginibre and G. Velo, On a class of nonlinear Schrödinger equations, I, J. Funct. Anal. 32 (1979), 1–32.
- [136] T. Kato, On nonlinear Schrödinger equations, Ann. Inst. H. Poincaré Phys. Théor. 46(1987), 113–129.
- [137] H. Berestycki and P. L. Lions, Nonlinear scalar field equations, I, Arch. Rational Mech. Anal. 82 (1983), 313–345.
- [138] I. Iliev and K. Kirchev, Stability and instability of solitary waves for one-dimensional singular Schrödinger equations, Differential Integral Equations 6 (1993), 685–703.
- [139] H. Berestycki and T. Cazenave, Instabilité des états stationnaires dans les équations de Schrödinger et de Klein-Gordon non linéaires, C. R. Acad. Sci. Paris 293 (1981), 489–492.
- [140] R. Fukuizumi, Stability and instability of standing waves for the nonlinear Schrödinger equation with harmonic potential, Discrete Contin. Dynam. Systems. 7 (2001), 525–544.
- [141] R. Fukuizumi, Stability of standing waves for nonlinear Schrödinger equations with critical power nonlinearity and potentials, Advances in Differential Equations 10 (2005), 259–276.
- [142] R. Fukuizumi and M. Ohta, Instability of standing waves for nonlinear Schrödinger equations with potentials, Differential and Integral Eqs. 16 (2003), 691–706.
- [143] R. Fukuizumi and M. Ohta, Stability of standing waves for nonlinear Schrödinger equations with potentials, Differential and Integral Eqs. 16 (2003), 111–128.
- [144] R. Fukuizumi and M. Ohta, Instability of standing waves for nonlinear Schrödinger equations with inhomogeneous nonlinearities, J. Math. Kyoto Univ. 45 (2005), 145–158.

- [145] M. Grillakis, J. Shatah and W. Strauss, Stability theory of solitary waves in the presence of symmetry, I, *J. Funct. Anal.* 74 (1987), 160–197.
- [146] J. Shatah and W. A. Strauss, Instability of nonlinear bound states, *Comm. Math. Phys.* 100 (1985), 173–190.
- [147] M. I. Weinstein, Nonlinear Schrödinger equations and sharp interpolation estimates, *Comm. Math. Phys.* 87 (1983), 567–576.
- [148] T. Cazenave and P. L. Lions, Orbital stability of standing waves for some nonlinear Schrödinger equations, *Comm. Math. Phys.* 85 (1982), 549–561.
- [149] M. Ohta, Stability and instability of standing waves for one-dimensional nonlinear Schrödinger equations with double power nonlinearity, *Kodai Math. J.* 18 (1995), 68–74.
- [150] A. Comech and D. Pelinovski, Purely nonlinear instability of standing waves with minimal energy, *Comm. Pure Appl. Math.* 56 (2003), 1565–1607.
- [151] Masaya Maeda , Stability of bound states of Hamiltonian PDEs in the degenerate cases, *Journal of Functional Analysis* 263 (2012) 511–528
- [152] Manoussos Grillakis, Jalal Shatah,Walter Strauss, Stability theory of solitary waves in the presence of symmetry. I,*J. Funct. Anal.* 74 (1) (1987) 160–197. MR MR901236 (88g:35169).
- [153] Andrew Comech, Dmitry Pelinovsky, Purely nonlinear instability of standing waves with minimal energy, *Comm.Pure Appl. Math.* 56 (11) (2003) 1565–1607. MR 1995870 (2005h:37176).
- [154] Masahito Ohta, Instability of bound states for abstract nonlinear Schrödinger equations, *J. Funct. Anal.* 261 (1)(2011) 90–110.
- [155] Masaya Maeda, Instability of bound states of nonlinear Schrödinger equations with Morse index equal to two,*Nonlinear Anal.* 72 (3–4) (2010) 2100–2113. MR 2577607 (2010k:35466).
- [156] J. Ginibre, G. Velo, The global Cauchy problem for the nonlinear Klein–Gordon equation, *Math. Z.* 189 (4) (1985)487–505. MR 786279 (86f:35149).
- [157] Terence Tao, Nonlinear Dispersive Equations. Local and Global Analysis, CBMS Reg. Conf. Ser. Math., vol. 106,2006, published for the Conference Board of the Mathematical Sciences, Washington, DC. MR 2233925(2008i:35211).

- [158] Michael I. Weinstein, Modulational stability of ground states of nonlinear Schrödinger equations, SIAM J. Math.Anal. 16 (3) (1985) 472–491. MR MR783974 (86i:35130).
- [159] Jalal Shatah, Stable standing waves of nonlinear Klein–Gordon equations, Comm. Math. Phys. 91 (3) (1983) 313–327. MR 723756 (84m:35111).
- [160] Jalal Shatah, Walter Strauss, Instability of nonlinear bound states, Comm. Math. Phys. 100 (2) (1985) 173–190. MR MR804458 (87b:35159).
- [161] Masahito Ohta, Grozdena Todorova, Strong instability of standing waves for the nonlinear Klein–Gordon equationand the Klein–Gordon–Zakharov system, SIAM J. Math. Anal. 38 (6) (2007) 1912–1931 (electronic). MR 2299435(2008a:35198).
- [162] Masaya Maeda, Stability and instability of standing waves for 1-dimensional nonlinear Schrödinger equation withmultiple-power nonlinearity, Kodai Math. J. 31 (2) (2008) 263–271. MR 2435895 (2009k:35304).
- [163] Nicolas Privault, A transfer Principle from Wiener to Poisson Space and Applications, Soumis au, Journal of Functional Analysis, Boulevard des Coquibus, 91025 Evry Cedex, France.
- [164] P. Malliavin. Stochastic calculus of variations and hypoelliptic operators. In Intern. Symp.SDE. Kyoto, pages 195{253, Tokyo, 1976. Kinokumiya.
- [165] D. Nualart and E. Pardoux. Stochastic calculus with anticipative integrands. Probab. TheoryRelated Fields, 78:535-582, 1988.
- [166] S. Watanabe. Lectures on Stochastic Differential Equations and Malliavin Calculus. TataInstitute of Fundamental Research, 1984.
- [167] B. Gaveau and P. Trauber. L'intégrale stochastique comme opérateur de divergence dansl'espace fonctionnel. J. Funct. Anal., 46:230-238, 1982.
- [168] P.A. Meyer. Transformations de Riesz pour les lois gaussiennes. In Séminaire de ProbabilitésXVIII, Lecture Notes in Mathematics, pages 179-193. Springer Verlag, 1984.
- [169] E. Carlen and E. Pardoux. Differential calculus and integration by parts on Poisson space.In S. Albeverio, Ph. Blanchard, and D. Testard, editors, Stochastics, Algebra and Analysis inClassical and Quantum Dynamics (Marseille, 1988), volume 59 of Math. Appl., pages 63-73.Kluwer Acad. Publ., Dordrecht, 1990.

- [170] D. Nualart and J. Vives. Anticipative calculus for the Poisson process based on the Fock space. In Séminaire de Probabilités XXIV, volume 1426 of Lecture Notes in Math., pages 154-165. Springer, Berlin, 1990.
- [171] N. Privault. Chaotic and variational calculus in discrete and continuous time for the Poissonprocess. Stochastics and Stochastics Reports, 51:83-109, 1994.
- [172] N. Bouleau and F. Hirsch. Dirichlet Forms and Analysis on Wiener Space. de Gruyter, 1991.
- [173] A.S. Üstünel and M. Zakai. On the structure on independence on Wiener space. J. Funct.Anal., 90(1):113-137, 1990.
- [174] A. Erdélyi, W. Magnus, F. Oberhettinger, and F. G. Tricomi. Higher Transcendental Functions, volume 2. McGraw Hill, New York, 1953.
- [175] A.S.Üstünel and M. Zakai. On independence and conditioning on Wiener space. Ann. Probab.,17(4):1441-1453, 1989.
- [176] J.M.C. Clark. The representation of functionals of Brownian motion by stochastic integrals. Annals of Mathematical Statistics, 41:1281-1295, 1970.
- [177] X. Fernique. Intégrabilité des vecteurs gaussiens. C. R. Acad. Sci. Paris Sér. I Math., 270:1698-1699, 1970.
- [178] A.S.Üstünel. Intégrabilité exponentielle de fonctionnelles de Wiener. C. R. Acad. Sci. Paris Sér. I Math., 315:279-282, 1992.
- [179] F. Hirsch and S. Song. Markov properties of multiparameter processes and capacities. Probab.Theory Related Fields, 103(1):45-71, 1995.
- [180] S. Song. Inégalités relatives aux processus d'Ornstein-Uhlenbeck à n paramètres et capacités gaussiennes cn;2. In Séminaire de Probabilités, volume XXVII, pages 276-301. Springer-Verlag,1993.
- [181] F. Hirsch. Représentation du processus d'Ornstein-Uhlenbeck à n paramátres. In J Azéma,P.A. Meyer, and M. Yor, editors, Séminaire de Probabilités XXVII, volume 1557 of LectureNotes in Mathematics, pages 302-303. Springer-Verlag, 1993.
- [182] Nicolas Privault, Measure invariance on the Lie-Wiener path space, Mathematics Subject Classification: 60H07, 58G32.
- [183] A.S. Üstünel and M. Zakai. Random rotations of the Wiener path. Probab. Theory Relat. Fields, 103(3):409–429, 1995.

- [184] N. Privault. Moment identities for Skorohod integrals on the Wiener space and applications. *Electron. Commun. Probab.*, 14:116–121 (electronic), 2009.
- [185] N. Privault. Random Hermite polynomials and Girsanov identities on the Wiener space. *Infin.Dimens. Anal. Quantum Probab. Relat. Top.*, 13(4):663–675, 2010.
- [186] S. Fang and J. Franchi. Platitude de la structure riemannienne sur le groupe des cheminset identité d'énergie pour les intégrales stochastiques. *C. R. Acad. Sci. Paris Sér. I Math.*, 321(10):1371–1376, 1995.
- [187] M. Pontier and A.S. Üstünel. Analyse stochastique sur l'espace de Lie-Wiener. *C. R. Acad. Sci. Paris Sér. I Math.*, 313:313–316, 1991.
- [188] A.S. Üstünel. Stochastic analysis on Lie groups. In *Stochastic Analysis and Related TopicsVI: The Geilo Workshop, Progress in Probability*, pages 129–158. Birkhäuser, 1996.
- [189] A.S. Üstünel and M. Zakai. Transformation of measure on Wiener space. *Springer Monographs in Mathematics*. Springer-Verlag, Berlin, 2000.
- [190] M. Zakai and O. Zeitouni. When does the Ramer formula look like the Girsanov formula ? *Ann. Probab.*, 20(3):1436–1440, 1992.
- [191] A.S.Üstünel. Analysis onWiener space and applications. Preprint arXiv:1003.1649v1, 2010.
- [192] N. Privault. Quantum stochastic calculus applied to path spaces over Lie groups. In *Proceedings of the International Conference on Stochastic Analysis and Applications*, pages 85–94.Kluwer Acad. Publ., Dordrecht, 2004.
- [193] A.V. Skorokhod. On a generalization of a stochastic integral. *Theor. Probab. Appl.*, XX:219–233, 1975.
- [194] B. Simon. Trace ideals and their applications, volume 35 of London Mathematical SocietyLecture Note Series. Cambridge University Press, Cambridge, 1979.
- [195] A. Segall and T. Kailath. Orthogonal functionals of independent-increment processes. *IEEETrans. Information Theory*, IT-22(3):287–298, 1976.
- [196] P.A. Meyer. Un cours sur les intégrales stochastiques. In *Séminaire de Probabilités, X (Seconde partie: Théorie des intégrales stochastiques, Univ. Strasbourg, Strasbourg, annéeuniversitaire 1974/1975)*, pages 245–400. Lecture Notes in Math., Vol. 511, Berlin, 1976.

- [197] Nicolas Privault, Laplace Transform Identities and Measure-Preserving Transformations on the Lie-Wiener-Poisson Spaces, Mathematics Subject Classification: 60H07, 60H05, 58G32., July 31, 2012
- [198] A.S. Üstünel and M. Zakai. Random rotations of the Wiener path. *Probab. Theory Relat. Fields*, 103(3):409-429, 1995.
- [199] A.S. Üstünel and M. Zakai. Transformation of measure on Wiener space. Springer Monographs in Mathematics. Springer-Verlag, Berlin, 2000.
- [200] S. Fang and J. Franchi. Platitude de la structure riemannienne sur le groupe des chemins et identité d'énergie pour les intégrales stochastiques. *C. R. Acad. Sci. Paris Sér. I Math.*, 321(10):1371-1376, 1995.
- [201] M. Pontier and A.S. Üstünel. Analyse stochastique sur l'espace de Lie-Wiener. *C. R. Acad. Sci. Paris Sér. I Math.*, 313:313-316, 1991.
- [202] A.S. Üstünel. Stochastic analysis on Lie groups. In *Stochastic Analysis and Related Topics VI: The Geilo Workshop, Progress in Probability*, pages 129-158. Birkhäuser, 1996.
- [203] E. Carlen and E. Pardoux. Differential calculus and integration by parts on Poisson space. In S. Albeverio, Ph. Blanchard, and D. Testard, editors, *Stochastics, Algebra and Analysis in Classical and Quantum Dynamics (Marseille, 1988)*, volume 59 of *Math. Appl.*, pages 63-73. Kluwer Acad. Publ., Dordrecht, 1990.
- [204] R.J. Elliott and A.H. Tsoi. Integration by parts for Poisson processes. *J. Multivariate Anal.*, 44(2):179-190, 1993.
- [205] N. Privault. A transfer principle from Wiener to Poisson space and applications. *J. Funct. Anal.*, 132:335-360, 1995.
- [206] B. Simon. Trace ideals and their applications, volume 120 of *Mathematical Surveys and Monographs*. American Mathematical Society, Providence, RI, second edition, 2005.
- [207] M. Zakai and O. Zeitouni. When does the Ramer formula look like the Girsanov formula? *Ann. Probab.*, 20(3):1436-1440, 1992.
- [208] N. Privault. Cumulant operators for Lie-Wiener-Itô-Poisson stochastic integrals. Preprint, 2012.
- [209] N. Privault. Random Hermite polynomials and Girsanov identities on the Wiener space. *Infin. Dimens. Anal. Quantum Probab. Relat. Top.*, 13(4):663-675, 2010.

- [210] N. Privault. Measure invariance on the Lie-Wiener path space. In L. Decreusefond and J. Najim, editors, *Stochastic Analysis and Related Topics in Honour of A. S. Ustunel*, volume 22 of *Springer Proceedings in Mathematics & Statistics*. Springer Verlag, 2012.
- [211] N. Privault. Moment identities for Poisson-Skorohod integrals and application to measureinvariance. *C. R. Math. Acad. Sci. Paris*, 347:1071{1074, 2009.
- [212] A.V. Skorokhod. On a generalization of a stochastic integral. *Theor. Probab. Appl.*, XX:219-233,1975.
- [213] N. Privault. Moment identities for Skorohod integrals on the Wiener space and applications. *Electron. Commun. Probab.*, 14:116-121 (electronic), 2009.
- [214] N. Privault. Quantum stochastic calculus applied to path spaces over Lie groups. In *Proceedings of the International Conference on Stochastic Analysis and Applications*, pages 85-94. KluwerAcad. Publ., Dordrecht, 2004.
- [215] N. Privault. *Stochastic Analysis in Discrete and Continuous Settings*, volume 1982 of *LectureNotes in Mathematics*. Springer-Verlag, Berlin, 309 pp., 2009.
- [216] N. Privault. Connections and curvature in the Riemannian geometry of configuration spaces. *J. Funct. Anal.*, 185(2):367-403, 2001.
- [217] K. Bichteler. *Stochastic integration with jumps*, volume 89 of *Encyclopedia of Mathematics and its Applications*. Cambridge University Press, Cambridge, 2002.
- [218] T.S. Chiang, Y. Chow, and Y.J. Lee. Evaluation of certain functional integrals. *IMA PreprintSeries*, 245, 1986.
- [219] Shawgy Hussein and Mohammed El Fatih, PhD thesis, Sudan University of science and Technology, 2015.