

Caron, L. A.; Huard, D.; Kröger, H.; Melkonyan, G.; Moriarty, K. J. M.; Nadeau, L. P.
Is quantum chaos weaker than classical chaos? (English) Zbl 1118.81321
Phys. Lett., A 322, No. 1-2, 60-66 (2004).

Summary: We investigate chaotic behavior in a 2D Hamiltonian system-oscillators with anharmonic coupling. We compare the classical system with quantum system. Via the quantum action, we construct Poincaré sections and compute Lyapunov exponents for the quantum system. We find that the quantum system is globally less chaotic than the classical system. We also observe with increasing energy the distribution of Lyapunov exponents approaching a Gaussian with a strong correlation between its mean value and energy.

MSC:

81Q50 Quantum chaos

37N20 Dynamical systems in other branches of physics (quantum mechanics, general relativity, laser physics)

Cited in **2** Documents

Keywords:

Fundamentals of quantum mechanics; quantum chaos

Full Text: [DOI](#)

References:

- [1] Friedrich, H.; Wintgen, D., Phys. rep., 183, 37, (1989)
- [2] Milner, V.; Hansen, J.L.; Campbell, W.C.; Raizen, M.G., Phys. rev. lett., 86, 1514, (2001)
- [3] Friedman, N.; Kaplan, A.; Carasso, D.; Davidson, N., Phys. rev. lett., 86, 1518, (2001)
- [4] Dembrowski, C.; Gräff, H.D.; Heine, A.; Hesse, T.; Rehfeld, H.; Richter, A., Phys. rev. lett., 86, 3284, (2001)
- [5] McDonald, S.W.; Kaufman, A.N., Phys. rev. lett., 42, 1189, (1979)
- [6] Heller, E.J., Phys. rev. lett., 53, 1515, (1984)
- [7] Steck, D.A.; Oskay, W.H.; Raizen, M.G., Science, 293, 274, (2001)
- [8] Hensinger, W.K.; Häffner, H.; Browaeys, A.; Heckenberg, N.R.; Helmersson, K.; McKenzie, C.; Wilburn, G.J.; Phillips, W.D.; Roiston, S.L.; Rubinsztein-Dunlop, H.; Upcroft, B., Nature, 412, 52, (2001)
- [9] Bohigas, O.; Giannoni, M.J.; Schmit, C., Phys. rev. lett., 52, 1, (1984)
- [10] Bohigas, O.; Tomsovic, S.; Ullmo, D., Phys. rep., 223, 43, (1993)
- [11] Cametti, F.; Jona-Lasinio, G.; Presilla, C.; Toninelli, F., (), 431
- [12] Schwengelbeck, U.; Faisal, F.H.M., Phys. lett. A, 199, 281, (1995) · [Zbl 1020.81587](#)
- [13] Parmenter, R.H.; Valentine, R.W., Phys. lett. A, 201, 1, (1995)
- [14] Iacomelli, G.; Pettini, M., Phys. lett. A, 212, 29, (1996)
- [15] Partovi, M.H., Phys. rev. lett., 89, 144101, (2002)
- [16] Casetti, L.; Gatto, R.; Modugno, M., Phys. rev. E, 57, 1223, (1998)
- [17] Matinyan, S.G.; Müller, B., Phys. rev. lett., 78, 2515, (1997)
- [18] Jirari, H.; Kröger, H.; Luo, X.Q.; Moriarty, K.J.M.; Rubin, S.G., Phys. rev. lett., 86, 187, (2001)
- [19] Jirari, H.; Kröger, H.; Luo, X.Q.; Moriarty, K.J.M.; Rubin, S.G., Phys. lett. A, 281, 1, (2001)
- [20] Caron, L.A.; Jirari, H.; Kröger, H.; Luo, X.Q.; Melkonyan, G.; Moriarty, K.J.M., Phys. lett. A, 288, 145, (2001)
- [21] Kröger, H., Phys. rev. A, 65, 052118, (2002)
- [22] Jirari, H.; Kröger, H.; Luo, X.Q.; Melkonyan, G.; Moriarty, K.J.M., Phys. lett. A, 303, 299, (2002)
- [23] Huard, D.; Kröger, H.; Melkonyan, G.; Moriarty, K.J.M.; Nadeau, L.P., Phys. rev. A, 68, 034101, (2003)
- [24] Dahlquist, P.; Russberg, G., Phys. rev. lett., 65, 2837, (1990)
- [25] Pullen, R.A.; Edmonds, A.R., J. phys. A: math. gen., 14, L477, (1981)

[26] Prasad, A.; Ramaswamy, R., Phys. rev. E, 60, 2761, (1999)

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.