



Local Gram-Schmidt and Covariant Lyapunov Vectors and Exponents for Three Harmonic Oscillator Problems

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We compare the Gram-Schmidt and covariant phase-space-basis-vector descriptions for three time-reversible harmonic oscillator problems, in two, three, and four phase-space dimensions respectively. The two-dimensional problem can be solved analytically. The three-dimensional and four-dimensional problems studied here are simultaneously chaotic, time-reversible, and dissipative. Our treatment is intended to be pedagogical, for publication in Communications in Nonlinear Science and Numerical Computation and for use in an updated version of our book on Time Reversibility, Computer Simulation, and Chaos. Comments are very welcome.

Comments: 25 pages with 12 figures; New Figures 9-12 based on two billion timesteps rather than the two hundred million used in Version 1; Electronic publication in Communications in Nonlinear Science and Numerical Computation scheduled for 1 July 2011

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