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9. Ordinary Differential Equations and Dynamical Systems

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A New Method for Computing Lyapunov Exponents

We present a new method for the computation of Lyapunov exponents utilizing representations of orthogonal matrices applied to decompositions of M or $M\tilde{M}$ where M is the tangent map. This method uses a minimal set of variables, does not require renormalization or reorthogonalization, can be used to efficiently compute partial Lyapunov spectra, and does not break down when the Lyapunov spectrum is degenerate. Since our method is based on exact differential equations for the Lyapunov exponents, global invariances of the Lyapunov spectrum can be preserved.