

Symplectic Integrators

Definition (Symplecticity)

A map $\phi: T^*\mathbb{R}^d \rightarrow T^*\mathbb{R}^d$ is *symplectic* if $\frac{\partial \phi^T}{\partial \mathbf{z}} \mathbb{J}^{-1} \frac{\partial \phi}{\partial \mathbf{z}} = \mathbb{J}^{-1}$.

The flow map of a Hamiltonian system is symplectic.

Consider the simple pendulum with $H(q, p) = \frac{p^2}{2} - \cos q$.

