Exercises

Exercise D.1 Symplectic volume preservation. *Check that the sequence of mappings (D.19) is volume preserving,* $\det \hat{U} = 1$.

Exercise D.2 Noncommutativity. *Check that the commutators in (D.17) are not vanishing by showing that*

$$[\mathcal{B}, \mathcal{C}] = -p \left(V'' \frac{\partial}{\partial p} - V' \frac{\partial}{\partial q} \right) .$$

Exercise D.3 Symplectic leapfrog integrator. *Implement (D.20) for 2-dimensional Hamiltonian flows; compare it with Runge-Kutta integrator by integrating trajectories in some (chaotic) Hamiltonian flow.*