El método de Verlet nos dice

$$x(t+h) = x(t) + v(t)h + \frac{a(t)}{2}h^2 + \mathcal{O}(h^4)$$

$$v(t+h) = v(t) + h\frac{a(t+h) + a(t)}{2}$$

$$\frac{\partial x_{n+1}}{\partial x_n} = 1;\ \frac{\partial x_{n+1}}{\partial v_n} = h$$

$$\frac{\partial v_{n+1}}{\partial x_n} = 0;\ \frac{\partial v_{n+1}}{\partial v_n} = 1$$

Entonces

$$J = \frac{\partial x_{n+1}}{\partial x_n}\frac{\partial v_{n+1}}{\partial v_n} - \frac{\partial x_{n+1}}{\partial v_n}\frac{\partial v_{n+1}}{\partial x_n} = (1)(1) - (h)(0) = 0$$