$$\sum_{p=1}^{q-1} b_p \vec{a}_{n-p+1} = \frac{4}{6}\vec{a}_n - \frac{a_{n-1}}{6} \; ; \; \sum_{p=1}^{q-1} c_p \vec{a}_{n-p+1} = \frac{\vec{a}_{n+1}}{6} + \frac{1}{3}\vec{a}_n$$

$\text{tq } q = 3$

$$* \sum_{p=1}^{3-1} b_p \vec{a}_{n-p+1} = b_1 \vec{a}_n + b_2 \vec{a}_{n-1} = \frac{4}{6}\vec{a}_n - \frac{1}{6}\vec{a}_{n-1} \therefore b_1 = \frac{4}{6} \, , \, b_2 = \frac{-1}{6}$$

$$* \sum_{p=1}^{3-1} c_p \vec{a}_{n-p+2} = c_1 \vec{a}_{n+1} + c_2 \vec{a} = \frac{1}{6}\vec{a}_{n+1} + \frac{1}{3}\vec{a}_n \therefore c_1 = \frac{1}{6} \, , \, c_2 = \frac{1}{3}$$

Para $q=3$:

$$\sum_{p=1}^{q-1} d_p \vec{a}_{n-p+2} = \frac{1}{3}\vec{a}_{n+1} + \frac{1}{6}\vec{a}_n$$

$$d_1\vec{a}_{n+1} + d_2\vec{a}_n = \frac{1}{3}\vec{a}_{n+1} + \frac{1}{6}\vec{a}_n$$

$$\therefore d_1 = \frac{1}{3}, \; d_2 = \frac{1}{6}$$

4 Usando las fórmulas de Verlet:

$$x_{n+1} = x_n + v_n \cdot h + \frac{a_n}{2} h^2 \quad ; \quad v_{n+1} = v_n + \frac{a_n + a_{n+1}}{2} h$$

Para el jacobiano: $$J = \frac{\partial x_{n+1}}{\partial x_n} \cdot \frac{\partial v_{n+1}}{\partial v_n} - \frac{\partial x_{n+1}}{\partial v_n} \cdot \frac{\partial v_{n+1}}{\partial x_n} = 1 \cdot 1 - h \cdot 0 = 1$$

$\therefore$ $\underline{J = 1}$