$$-\frac{\partial H}{\partial \mathbf{x}_a} = \dot{\mathbf{p}}_a = e_a \sum_{b \neq a} \frac{e_b \hat{\mathbf{n}}_{ab}}{R_{ab}^2} \left[1 - \left(\frac{1}{2 m_a m_b c^2} \right) (\mathbf{p}_a \cdot \mathbf{p}_b) \right] - e_a \sum_{b \neq a} \frac{3 e_b \hat{\mathbf{n}}_{ab}}{2 m_a m_b c^2 R_{ab}^2} (\mathbf{p}_a \cdot \hat{\mathbf{n}}_{ab}) (\mathbf{p}_b \cdot \hat{\mathbf{n}}_{ab}) +$$

$$e_a \sum_{b \neq a} \frac{e_b}{2 m_a m_b c^2 R_{ab}^2} \left[\mathbf{p}_a (\mathbf{p}_b \cdot \hat{\mathbf{n}}_{ab}) + \mathbf{p}_b (\mathbf{p}_a \cdot \hat{\mathbf{n}}_{ab}) \right]$$