

[mex82] Effect of point transformation on canonical equations

Consider the point transformation $q_i = q_i(Q_1, \dots, Q_n, t), i = 1, \dots, n$ between two sets of generalized coordinates. Use the results stated in [mex80] to show (by substitution of coordinates) that the structure of the canonical equations is the same before and after the point transformation:

$$\dot{q}_i = \frac{\partial H}{\partial p_i}, \quad \dot{p}_i = -\frac{\partial H}{\partial q_i} \quad \Leftrightarrow \quad \dot{Q}_i = \frac{\partial \tilde{H}}{\partial P_i}, \quad \dot{P}_i = -\frac{\partial \tilde{H}}{\partial Q_i}.$$

Solution: