

From dp_i :

$$\boxed{\frac{\partial H}{\partial p_i} = \dot{q}_i}$$

From dq_i :

$$\frac{\partial H}{\partial q_i} - \frac{\partial^2 F}{\partial q_i \partial t} = -\dot{p}_i - \frac{\partial^2 F}{\partial q_i \partial t}$$

$$\boxed{\frac{\partial H}{\partial q_i} = -\dot{p}_i}$$

The time derivatives differ:

$$\boxed{\frac{\partial H'}{\partial t} = \frac{\partial H}{\partial t} - \frac{\partial}{\partial t} \left(\frac{dF}{dt} \right)}$$