

The main formula of differentiation

Let $S = S_t(x, q)$ be one parametric family of actions, and let $g = g_t(t)$ be one-parametric family of functions, then

$$\frac{d}{dt} (\Phi_{S_t} g_t) = \frac{\partial S(x, q)}{\partial t} + \frac{\partial g_t(y)}{\partial t}.$$