

$$\frac{\partial \tilde{\mathbf{q}}}{\partial t} = f_g(\tilde{\mathbf{q}}) - \frac{\dot{g}}{g} y \frac{\partial \tilde{\mathbf{q}}}{\partial y} - G(1/g) \dot{G}(g, \dot{g}) \tilde{\mathbf{q}}(x, y, t)$$