g) $p_r = mV = m \frac{d\sqrt{x^2+y^2}}{dt}$

$\vec{r}_0 = (r_0 \cos\phi, r_0 \operatorname{sen}\phi)$

$\vec{V}_0 = (\dot{x}, \dot{y}) = (V_0 \cos\theta_0, V_0 \operatorname{Sen}\theta_0)$

$$\tilde{p}_{r_0} = \frac{p_{r_0}}{md} = \frac{dr_0}{dt}\frac{1}{d} = \frac{x_0\dot{x}_0 + y_0\dot{y}_0}{r_0 d}$$

$$= \frac{\cancel{r_0}(\cos\phi_0 \boxed{V_0} \cos\theta_0 + \sin\theta_0 \boxed{V_0} \sin\phi_0)}{\boxed{\cancel{r_0}} d} \quad \tilde{V}_0$$

$$= \tilde{V}_0 (\cos(\phi_0)\cos(\theta_0) + \sin(\phi_0)\sin(\theta_0)) = \tilde{V}_0 \cos(\theta_0 - \phi_0)$$

Para ϕ:

$$\frac{d\phi}{dt} = \frac{d(\arctan(x/y))}{dt} \Rightarrow mr^2\frac{d\phi}{dt} = p_\phi$$

$$p_\phi = mr^2 \frac{d(\arctan(x/y))}{dt}$$

$$\tilde{p}_{\phi_0} = \frac{p_{\phi_0}}{md^2} = \frac{mr_0^2}{md^2}\dot{\phi} = \tilde{r}_0^2 \frac{1}{1+\left(\frac{y_0}{x_0}\right)} \frac{d\left(\frac{y_0}{x_0}\right)}{dt}$$

$$= \tilde{r}_0^2 \frac{1}{x_0^2 + y_0^2}(\dot{y}x - \dot{x}y) = \frac{\tilde{r}_0^2}{r_0^2}(\dot{y}x - \dot{x}y)$$

$$= \frac{1}{d^2}(V_0 r_0 \sin\theta_0 \cos\phi_0 - V_0 r_0 \cos\theta_0 \sin\phi_0)$$

$$= \tilde{V}_0 \tilde{r}_0 (\sin\theta_0 \cos\phi_0 - \cos\theta_0 \sin\phi_0) = \tilde{V}_0 \tilde{r}_0 \sin(\theta_0 - \phi_0)$$