$$\frac{dx}{dt} = f(x,u)$$ ----------(1)

Taylor serie:

$$f(x,u) \approx f(x_s,u_s) + \left(\left.\frac{\partial f}{\partial x}\right|_{x_s,u_s}\right)(x-x_s) + \left(\left.\frac{\partial f}{\partial u}\right|_{x_s,u_s}\right)(u-u_s) + T.O.S$$ ----------(2)

$$\frac{dx_s}{dt} = f(x_s,u_s)$$ ----------(3)

Restando (3) de (2) y sustituyendo (1)

$$\left[\frac{dx}{dt}\right] - \left[\frac{dx_s}{dt}\right] \approx \left[f(x_s,u_s) + \left(\left.\frac{\partial f}{\partial x}\right|_{x_s,u_s}\right)(x-x_s) + \left(\left.\frac{\partial f}{\partial u}\right|_{x_s,u_s}\right)(u-u_s) + T.O.S\right] - \left[f(x_s,u_s)\right]$$

$$\boxed{\frac{d\overline{x}}{dt} \approx \left(\left.\frac{\partial f}{\partial x}\right|_{x_s,u_s}\right)(x-x_s) + \left(\left.\frac{\partial f}{\partial u}\right|_{x_s,u_s}\right)(u-u_s) + T.O.S}$$

Es una forma lineal de representar la ecuacion.