14.5) x explicit y implicit

$$\tilde{x}_{n+1} = x_n + (\alpha x_n - \beta x_n y_{n+1})\, dt$$

$$\tilde{y}_{n+1} = y_n + (\delta x_n y_{n+1} - \gamma y_n)\, dt$$

$$\tilde{y}_{n+1} - \delta x_n y_{n+1}\, dt = y_n - \gamma y_n\, dt$$

$$\tilde{y}_{n+1} = \frac{y_n}{1 - \delta x_n dt - \gamma dt}$$

Sub $\tilde{y}_{n+1}$ in $\tilde{x}_{n+1}$

$$x_{n+1} = x_n + (\alpha x_n - \beta x_n y_{n+1})\, dt$$

$$x_{n+1} = x_n \left[1 + \left(\alpha - \frac{\beta y_n}{1 - dt(\delta x_n - \gamma)} \right) dt \right]$$

Eq: 14.12 x implicit y explicit

$$x_{n+1} = x_n + (\alpha x_{n+1} - \beta x_{n+1} y_n)\, dt$$

$$x_{n+1} = x_n + \alpha x_{n+1} dt - \beta x_{n+1} y_n\, dt$$

$$x_{n+1} - \alpha x_{n+1} dt + \beta x_{n+1} y_n\, dt = x_n$$

$$x_{n+1} [1 - \alpha dt + \beta y_n dt] = x_n$$

$$x_{n+1} = \frac{x_n}{1 - \alpha dt - \beta y_n dt}$$

Now sub x_{n+1} in y_{n+1}

$$y_{n+1} = y_n + (\delta x_{n+1} y_n - \gamma y_n)\, dt$$

$$y_{n+1} = y_n + \left[\delta \frac{x_n y_n dt}{1 - \alpha dt - \beta y_n dt} - \gamma y_n \right]$$

$$y_{n+1} = y_n \left[1 + dt \left[\frac{\delta x_n}{1 - dt(\alpha - \beta y_n)} - \gamma \right] \right]$$