

# III. Ordinary Differential Equations

- Goals:
- solve IVPs numerically
  - basic methods (explicit/implicit) and their characteristics
  - stability and stiff equations

Why? E.g. time evolution of CSTR  
 " " " " tubular reactor  
MATLAB: ode45, ode23s, ...

## III.1 Problem statement and examples

Def.: A scalar first order Initial Value Problem (IVP) is given by  $\frac{dy}{dt} = \dot{y}(t) = f(t, y(t))$  scalar first order Ordinary Differential Equation (ODE) because only first derivative

$y(t_0) = y_0$  Initial Value (IV)

and an interval  $I = [t_0, T]$  on which the solution  $y(t)$  is sought.   
*initial final time*