# Integration of Ordinary Differential Equations

- Ordinary Differential Equations (ODE, ODEs)
- Numerical methods for ordinary differential equations
  - Euler method
  - Runge-Kutta methods
    - « most widely known member of the Runge–Kutta family is generally referred to as “RK4”, “classical Runge–Kutta method” or simply as “the Runge–Kutta method »
  - Adaptative stepsize control for Runge-Kutta methods
  - Predictor–corrector method
  - Richardson extrapolation

## applications

- chemical kinetics
- population dynamics, Logistic function (and equation)
  - Pierre François Verhulst model and non-linearity
- bifurcation, period doubling and routes to chaos
- Oscillating chemical reactions : Belousov-Zhabotinsky, Brusselator, Oregonator
- Lotka–Volterra equations (predator–prey equations)
- Lorenz system
- Strange attractor

## Références


- Numerical recipes, The Art of Scientific Computing 3rd Edition, William H. Press, Saul A. Teukolsky, William T. Vetterling, Brian P. Flannery, 2007, isbn: 9780521880688
  - http://numerical.recipes/
  - http://www2.units.it/ipl/students_area/imm2/files/Numerical_Recipes.pdf, p 707…
  - http://apps.nrbook.com/empanel/index.html#