Non-Ideal Flow:

* Two important parameters
* Different particles have own pathways
* Each pathway gives different residence times
* E curves account for Residence Time Distribution
  + % flow exiting reactor at time t
  + E curve is response from pulse
* F curves are integral of E
  + % particles exiting reactor between t1 and t2
  + F curve is response from step input
  + % change from old fluid to new fluid
  + F = C/Cmax [0,1]

Determining F from E

* Steep slope (inflection point) in F is peak in E
* Flat areas in F are valleys in E

Ideal Flow systems:

* PFR: shapes remain same, add time displacement (spacetime)
* MFR: shape remains same, time is same too
  + In - Out = VdC/dt
  + qC0 - qCt = VdC/dt
  + т = V/q
  + C0 - C = тdC/dt
  + ∫0t dt = ∫0C тdC/(C0-C)
  + t = -тln(C0-C/C0)
  + e-t/т = 1-C/C0
  + C/C0 = 1 - e-t/т = F
  + E = dF/dt = 1/т \* e-t/т

Conversion in Non-Ideal Flow Reactors

* Determine concentration exiting reactor
* (CA,avg/CA0)exit = ∫0∞(CA/CA0)Element \* Edt
  + CA = CA0(1-XA)
  + XA,average = ∫0∞(XA)Element \* Edt

First Order Reaction

* CA/CA0 = e-kt
  + -rA = kCA = -dCA/dt