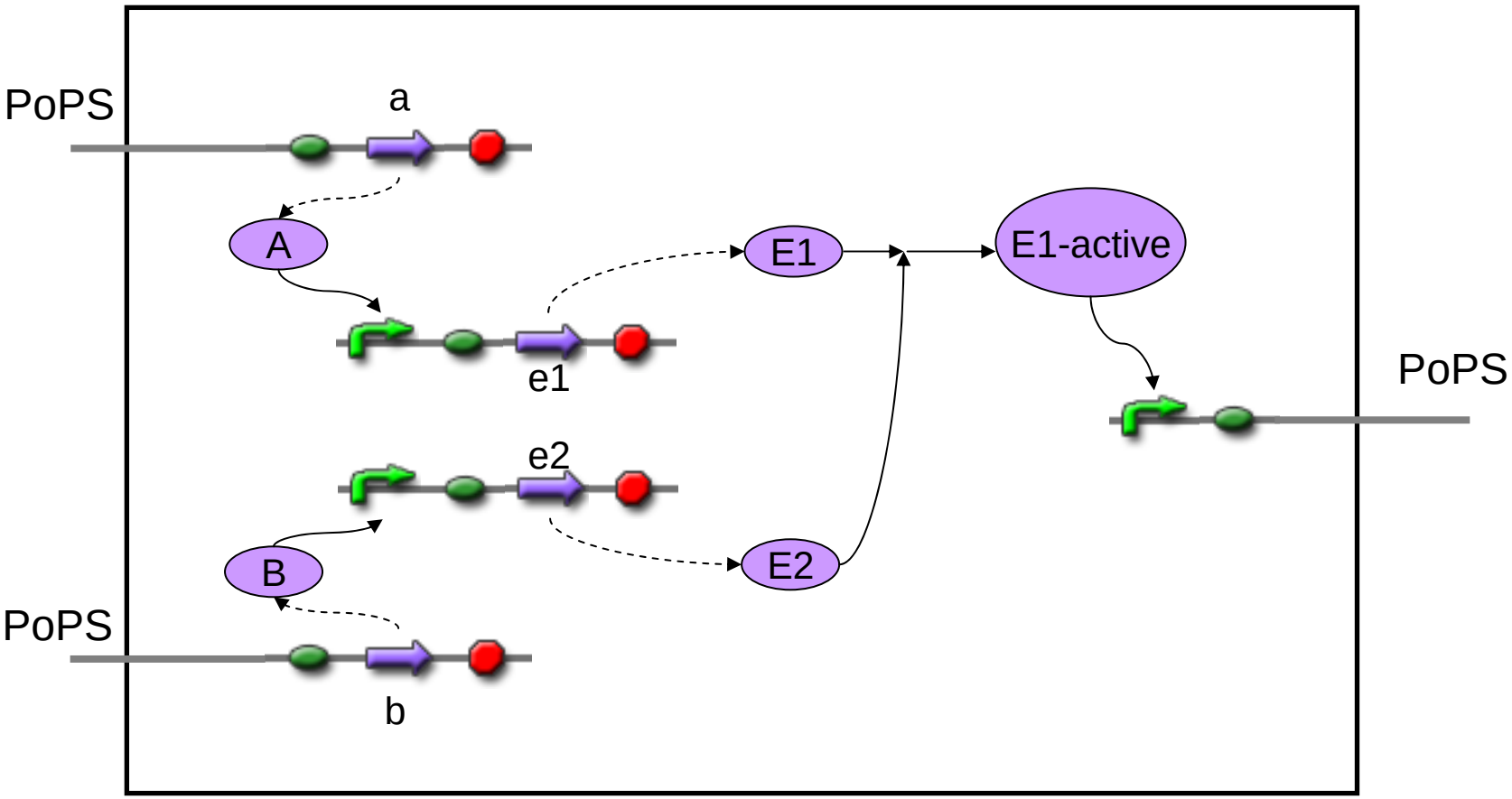
ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

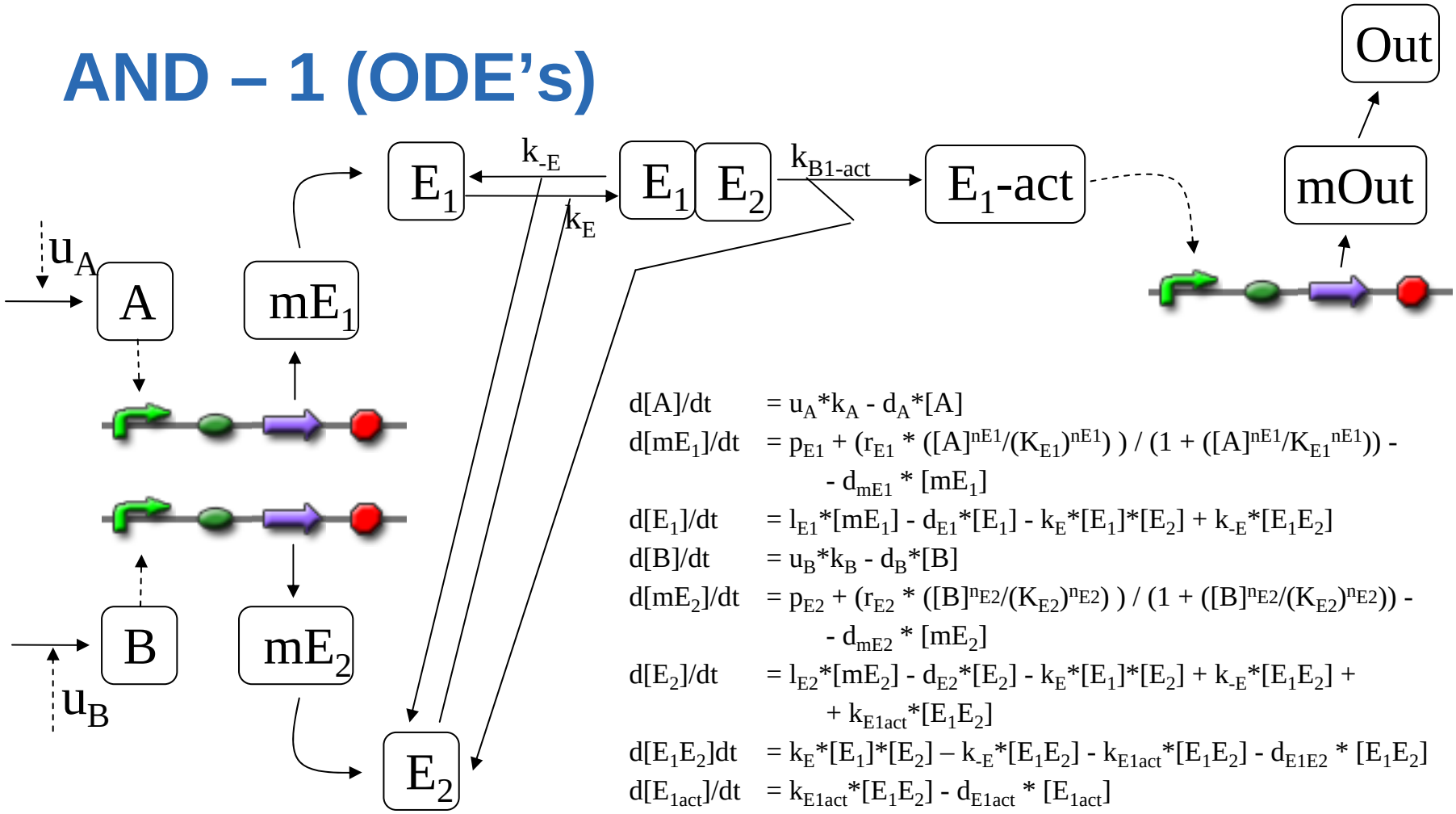
iGEM 2006

Half Adder - ODEs

AND – 1



AND – 1 (ODE's)



$$d[A]/dt = u_A*k_A - d_A*[A]$$

$$d[mE_1]/dt = p_{E1} + (r_{E1} * ([A]^{nE1}/(K_{E1})^{nE1})) / (1 + ([A]^{nE1}/K_{E1}{}^{nE1})) - - d_{mE1} * [mE_1]$$

$$d[E_1]/dt = l_{E1}*[mE_1] - d_{E1}*[E_1] - k_E*[E_1]*[E_2] + k_{-E}*[E_1E_2]$$

$$d[B]/dt = u_B*k_B - d_B*[B]$$

$$d[mE_2]/dt = p_{E2} + (r_{E2} * ([B]^{nE2}/(K_{E2})^{nE2})) / (1 + ([B]^{nE2}/(K_{E2})^{nE2})) - - d_{mE2} * [mE_2]$$

$$d[E_2]/dt = l_{E2}*[mE_2] - d_{E2}*[E_2] - k_E*[E_1]*[E_2] + k_{-E}*[E_1E_2] + + k_{E1act}*[E_1E_2]$$

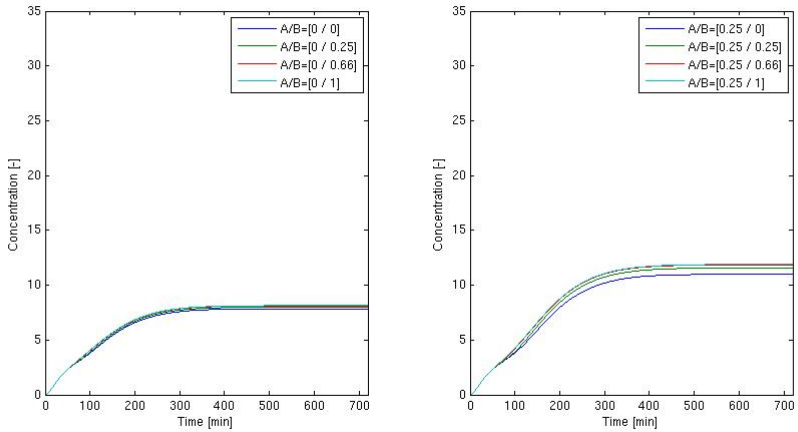
$$d[E_1E_2]dt = k_E*[E_1]*[E_2] – k_{-E}*[E_1E_2] - k_{E1act}*[E_1E_2] - d_{E1E2} * [E_1E_2]$$

$$d[E_{1act}]/dt = k_{E1act}*[E_1E_2] - d_{E1act} * [E_{1act}]$$

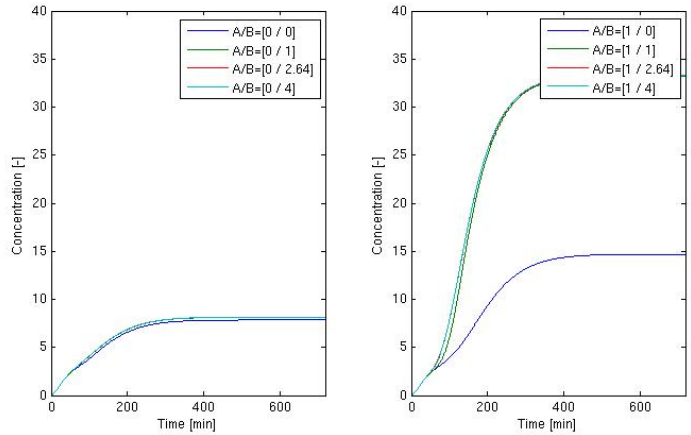
$$d[mOut]/dt = pOut - dmOut * [mOut] + (rOut * ((E_{1act})^{nOut}/(K_{Out})^{nOut})) / (1 + ((E_{1act})^{nOut}/(K_{Out})^{nOut}))$$

$$d[Out]/dt = l_{Out}*[mOut] - d_{Out}*[Out];$$

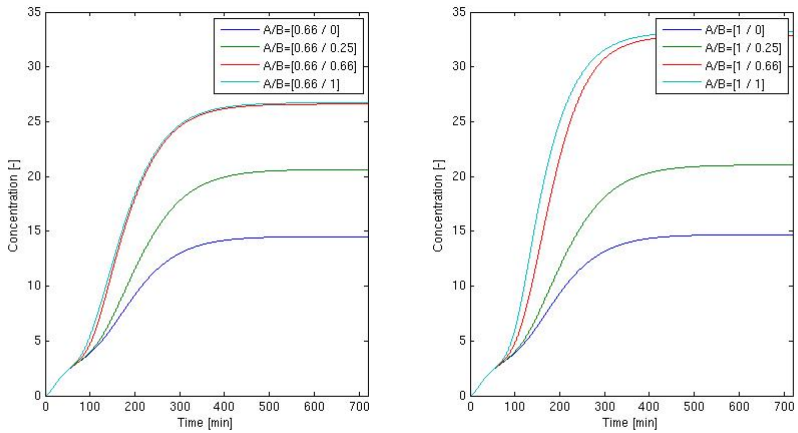
AND – 1 (simulation results)

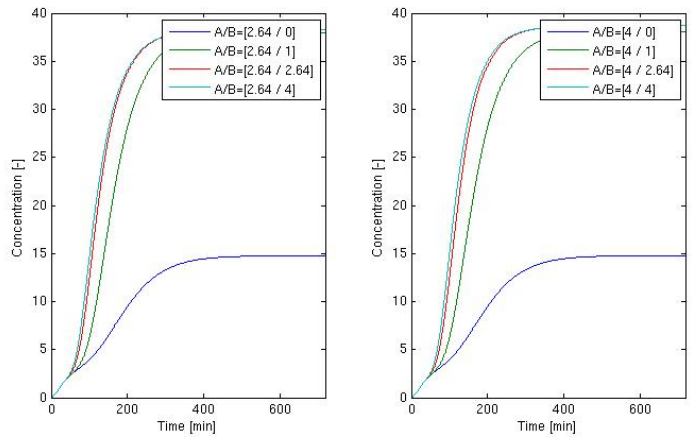


Input range 0…1

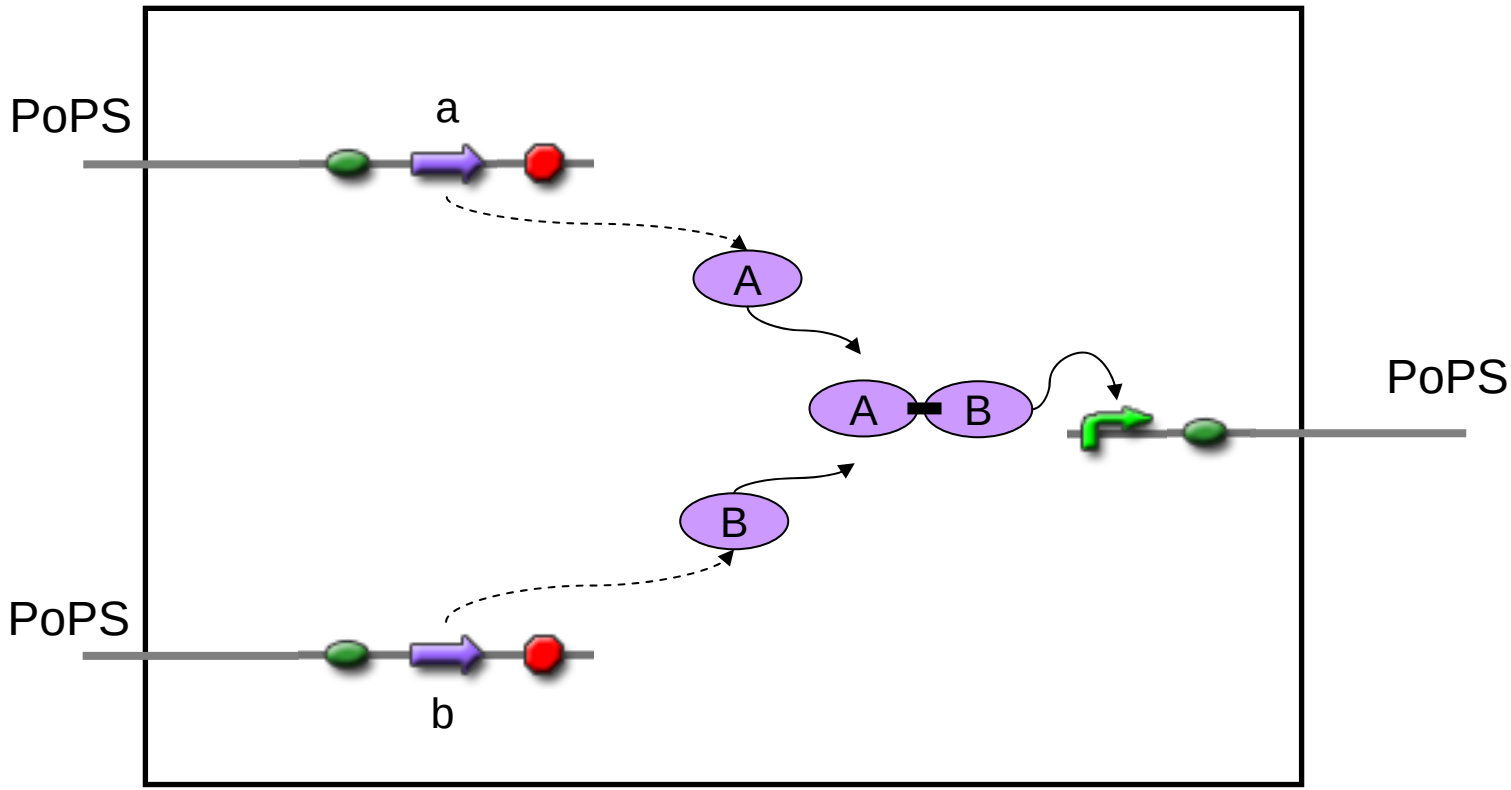


Input range 0…4

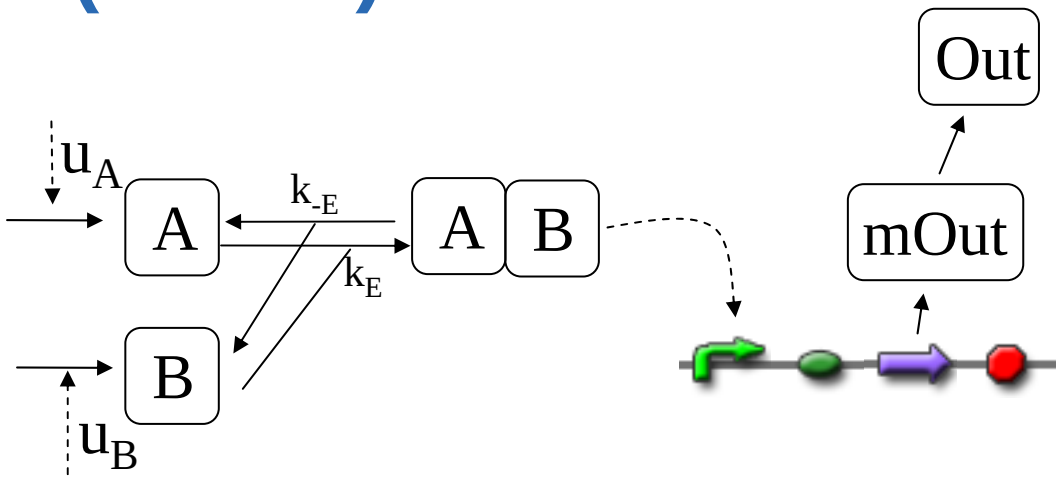




AND – 2



AND – 2 (ODE's)



$$d[A]/dt = u_A*k_A - d_A*[A] - k_{AB}*([A]*[B])^{nAB} + k_{-AB}*[AB]^{nAB}$$

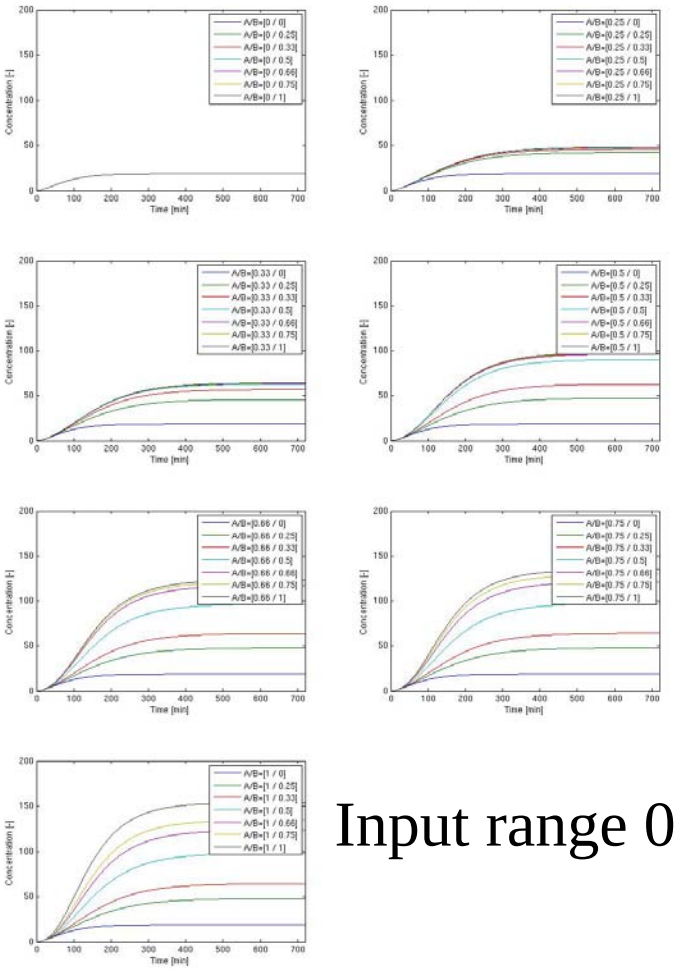
$$d[B]/dt = u_B*k_B - d_B*[B] - k_{AB}*([A]*[B])^{nAB} + k_{-AB}*[AB]^{nAB}$$

$$d[AB]/dt = k_{AB}*([A]*[B])^{nAB} - k_{-AB}*[AB]^{nAB} - d_{AB}*[AB]$$

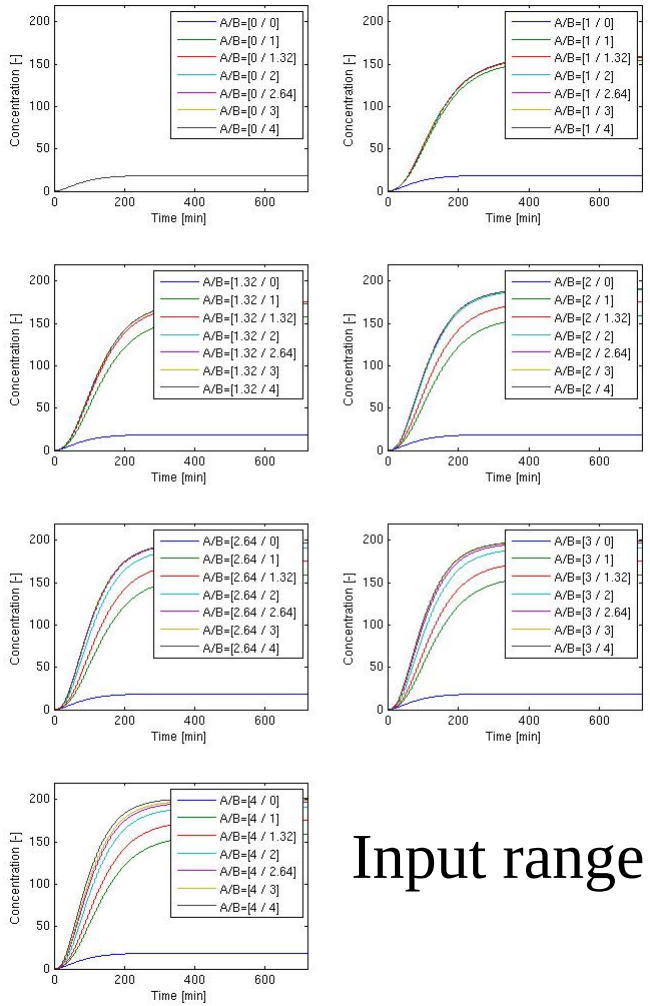
$$d[mOut]/dt = p_{Out} + (r_{Out} * ([AB]^{nOut}/(K_{Out})^{nOut})) / (1 + ([AB]^{nOut}/(K_{Out})^{nOut})) - d_{mOut} * [mOut]$$

$$d[Out]/dt = l_{Out}*[mOut] - d_{Out}*[Out]$$

AND – 2 (simulation results)



Input range 0…1



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