

```
model *BIOMD0000000012()
...
// Assignment Rules:
beta :=tau_mRNA /tau_prot;
alpha0 :=a0_tr *eff*tau_prot/(ln(2)*KM);
a0_tr :=ps_0 *60;
alpha :=a_tr *eff*tau_prot/(ln(2)*KM);
a_tr := (ps_a -ps_0 )*60;
t_ave :=tau_mRNA /ln(2);
kd_mRNA :=ln (2)/tau_mRNA;
kd_prot :=ln (2)/tau_prot;
k_tl :=eff /t_ave;
// Reactions:
Reaction1 :X => ;kd_mRNA *X;
Reaction2 :Y => ;kd_mRNA *Y;
Reaction3 :Z => ;kd_mRNA *Z;
Reaction4 : =>PX ;k_tl *X;
Reaction5 : =>PY ;k_tl *Y;
Reaction6 : =>PZ ;k_tl *Z;
Reaction7 :PX => ;kd_prot *PX;
Reaction8 :PY => ;kd_prot *PY;
Reaction9 :PZ => ;kd_prot *PZ;
Reaction10 : =>X ;a0_tr +a_tr *KM^n/(KM^n +PZ ^n);
Reaction11 : =>Y ;a0_tr +a_tr *KM^n/(KM^n +PX ^n);
Reaction12 : =>Z ;a0_tr +a_tr *KM^n/(KM^n +PY ^n);
...
end
// Models
modell =model "BIOMD0000000012"
model2 =model modell with ps_0 = 1.3e-05,ps_a = 0.013
// Simulations
simulation1=simulate uniform (0, 1000, 1000)
simulation1.algorithm =kisao .88
simulation2=simulate uniform_stochastic (0, 1000, 1000)
simulation2.algorithm =kisao .27
// Tasks
task1 =run simulation1 on modell
task2 =run simulation1 on model2
// Outputs
plot "protein numbers per time point" task1.time vs task1.PX,task1.PY,task1.PZ
plot "protein numbers per time point - damped oscillations" task2.time vs task2.PX,
task2.PY,task2.PZ
plot "Normalized Plot" task1.PX/max(task1.PX) vs task1.PY/max(task1.PY), task1.PY
/max(task1.PY) vs task1.PZ/max(task1.PZ),task1.PZ/max(task1.PZ) vs task1.PX /
max(task1.PX)
// Names
modell is "Repressilator-regular oscillations"
model2 is "Damped oscillations"
task1 is "Oscillation using a deterministic simulator"
task2 is "Damped oscillations using a deterministic simulator"
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