README MOMENTS SCRIPTS MAY 2017

This folder has MATLAB scripts for:

1. Generation of time-evolution equations for feedforward networks:

the script

FEEDME.m

includes stoichiometry and reaction definitions, for the following network:

0 → M → 0

M → M+P

P → 0

0 → E → 0

0 → F → 0

E+P → E+P+Q

Q → 0

F+Q → F+Q+R

R → 0

To apply to a different network, simply change the following variables:

* syms (include here symbols for all species and all parameters)
* params (repeat here only the parameters)
* species (repeat here only the species)
* G (the stoichiometry matrix)
* R (the reaction vector, given as a row)
* startexponents (the list of derived moments, for example [1 3 0 1] would mean <S1S23S4> )

2. Calculation of steady states for moments for feedforward networks:

run in the same MATLAB session the script

feedforward\_solve\_steady\_state.m

in order to get a matrix form for the solution and solve for steady state moments.

[WARNING: if there are conservation laws, then matrix is singular, and the code will terminate with an error condition because X = -inv(A1)\*b1 is not defined (see "if" condition). In that case, one should eliminate variables first, and then solve.]

3. calculation of steady state moments using complex balancing:

The script

competitive\_binding\_mean\_D\_using\_normalized.m

illustrates this method.

The script needs arguments: L, K, and the vector of total conserved quantities, assuming for simplicity that n\_B=1.

Sample usage:

competitive\_binding\_mean\_D(3,8,[4,1,7])

is used when L=3, M=8, n\_A=4, and n\_C=7 (and n\_B=1).