

$$\begin{aligned}dX_1/dt &= -k \cdot X_1 + a \cdot (X_1^n) / (S^n + X_1^n) + b \cdot \text{bmod} \cdot S^n / (S^n + X_2^n) \\dX_2/dt &= -k \cdot X_2 + a \cdot (X_2^n) / (S^n + X_2^n) + b \cdot S^n / (S^n + X_1^n)\end{aligned}$$

param k=1  
param a=0.37  
param b=varied  
param bmod=1 and 0.9  
param n=3  
param S=0.5  
init X<sub>1</sub>=.1  
init X<sub>2</sub>=.1

**Supplementary Table 1**

$$\begin{aligned}
dmRNAX_1/dt &= -kdegmRNA*mRNAX_1 + a*(X_1^n)/(S^n+X_1^n) + b*bmod*S^n/(S^n+X_2^n) \\
dmRNAX_2/dt &= -kdegmRNA*mRNAX_2 + a*(X_2^n)/(S^n+X_2^n) + b*S^n/(S^n+X_1^n) \\
dX_1/dt &= -kdegX_1*X_1 + t_1*mRNAX_1 \\
dX_2/dt &= -kdegX_2*X_2 + t_2*mRNAX_2
\end{aligned}$$

param kdegmRNA=1  
param kdegX<sub>1</sub>=2.0  
param kdegX<sub>2</sub>=2.0  
param t<sub>1</sub>=2.0  
param t<sub>2</sub>=2.0  
param a=0.37  
param b=varied  
**param bmod=1 and .9**  
param n=3  
param S=0.5  
init X<sub>1</sub>=.1  
init X<sub>2</sub>=.1  
init mRNAX<sub>1</sub>=0.30903  
init mRNAX<sub>2</sub>=0.30903

**Supplementary Table 2**

kdegmRNA=1 kdegX <sub>1</sub> =2.0 kdegX <sub>2</sub> =2.0 t <sub>1</sub> =2.0 t <sub>2</sub> =2.0 a=0.37 b=0.5 <b>bmod=0.9</b> n=3 S=0.5	FP #1:: [Xvar], [Yvar]: 0.71843, 0.13287 eval: -1.0018, -2.1135 Fixed point code, kind:: 1, stable node  FP #2:: [Xvar], [Yvar]: 0.47117, 0.3934 eval: -2.3397, 0.7513 Fixed point code, kind:: 3, hyperbolic fixed point  FB #3:: [Xvar], [Yvar]: 0.092641, 0.79259 eval: -2.0654, -1.3348 Fixed point code, kind:: 1, stable node
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**Supplementary Table 3**

fp 1::  $X_1, X_2, X_3$ : 0.87096, 0.17379, 0.86966  
eval: -2.6562, -1.1964, -0.9698  
Classification:: STABLE

fp 2::  $X_1, X_2, X_3$ : 0.59637, 0.59637, 0.61127  
eval: -3.4567, 0.042148, -0.018247  
Classification:: SADDLE

fp 3::  $X_1, X_2, X_3$ : 0.87096, 0.87096, 0.17216  
eval: -2.6517, -1.1982, -0.98216  
Classification:: STABLE

fp 4::  $X_1, X_2, X_3$ : 0.17379, 0.87096, 0.86966  
eval: -2.6562, -0.9698, -1.1964  
Classification:: STABLE

#### Supplementary Table 4

fp 1::  $X_1, X_2, X_3$ : 0.98855, 0.17378, 0.85416  
eval: -0.26751, -0.12971, -0.094436  
Classification:: STABLE

fp 2::  $X_1, X_2, X_3$ : 0.16982, 0.86099, 0.98625  
eval: -0.26628, -0.09806, -0.12996  
Classification:: STABLE

fp 3::  $X_1, X_2, X_3$ : 0.86099, 0.97724, 0.17147  
eval: -0.26733, -0.12851, -0.096932  
Classification:: STABLE

fp 4::  $X_1, X_2, X_3$ : 0.5188, 0.62373, 0.73976  
eval: -0.35175, 0.029603, -0.037242  
Classification:: SADDLE

fp 5::  $X_1, X_2, X_3$ : 0.74989, 0.50699, 0.6255  
eval: -0.35085, -0.041196, 0.033102  
Classification:: SADDLE

fp 6::  $X_1, X_2, X_3$ : 0.62373, 0.73282, 0.5226  
eval: -0.35259, 0.028229, -0.034615  
Classification:: SADDLE

fp 7::  $X_1, X_2, X_3$ : 0.62373, 0.62373, 0.61805  
eval: -0.35851,  
-0.0002282+0.018768i,  
-0.0002282-0.018768i

evec 1: **-0.57912 -0.57939 -0.57352**

evec 2: -0.28216-0.48707i

0.59458+0i

-0.30978+0.48338i

evec 3: -0.28216-0.48707i

0.59458+0i

-0.30978+0.48338i

Classification:: STABLE SPIRAL

(see details in legend and text)

**Supplementary Table 5**

<p>fp 1:: <math>X_1, X_2, X_3, X_4</math>: 0.285, 0.8875, 0.8875, 0.8875  eval: -0.020134, -0.33198, -0.12431, -0.12431  evec 1: 0.69857 -0.41312 -0.41312 -0.41312  evec 2: -0.30568 -0.54972 -0.54972 -0.54972  evec 3: 3.4173e-017 0.8165 -0.40825 -0.40825  evec 4: 9.478e-018 -0.45291 -0.36189 0.8148  Classification:: STABLE</p> <p>fp 2:: <math>X_1, X_2, X_3, X_4</math>: 0.365, 0.84, 0.84, 0.84  eval: 0.014198, -0.35629, -0.11062, -0.11062  evec 1: 0.69689 -0.41406 -0.41406 -0.41406  evec 2: -0.3039 -0.55004 -0.55004 -0.55004  evec 3: 8.5421e-017 0.8165 -0.40825 -0.40825  evec 4: -5.4025e-017 -0.2582 -0.54172 0.79992  Classification:: SADDLE</p> <p>fp 3:: <math>X_1, X_2, X_3, X_4</math>: 0.8875, 0.285, 0.8875, 0.8875  eval: -0.33198, -0.12431, -0.020134, -0.12431  evec 1: 0.54972 0.30568 0.54972 0.54972  evec 2: 0.8165 -1.386e-016 -0.40825 -0.40825  evec 3: -0.41312 0.69857 -0.41312 -0.41312  evec 4: 0.081721 -8.3721e-017 -0.74442 0.6627  Classification:: STABLE</p> <p>fp 4:: <math>X_1, X_2, X_3, X_4</math>: 0.84, 0.365, 0.84, 0.84  eval: -0.35629, -0.11062, 0.014198, -0.11062  evec 1: 0.55004 0.3039 0.55004 0.55004  evec 2: 0.8165 1.3143e-017 -0.40825 -0.40825  evec 3: -0.41406 0.69689 -0.41406 -0.41406  evec 4: 0.12674 -1.9466e-017 -0.76191 0.63516  Classification:: SADDLE</p> <p>fp 5:: <math>X_1, X_2, X_3, X_4</math>: 0.88625, 0.88625, 0.8875, 0.29  eval: -0.33286, -0.017533, -0.12398, -0.1242  evec 1: 0.54987 0.54987 0.55074 0.30325  evec 2: 0.41484 0.41484 0.41355 -0.69627  evec 3: -0.70711 0.70711 4.2987e-014 -9.2019e-017  evec 4: -0.40718 -0.40718 0.81756 -0.00052758  Classification:: STABLE</p>	<p>fp 6:: <math>X_1, X_2, X_3, X_4</math>: 0.84, 0.84, 0.84, 0.365  eval: -0.35629, -0.11062, 0.014198, -0.11062  evec 1: 0.55004 0.55004 0.55004 0.3039  evec 2: 0.8165 -0.40825 -0.40825 -1.6237e-016  evec 3: -0.41406 -0.41406 -0.41406 0.69689  evec 4: -0.3703 -0.44506 0.81535 1.5548e-016  Classification:: SADDLE</p> <p>fp 7:: <math>X_1, X_2, X_3, X_4</math>: 0.88625, 0.88625, 0.29, 0.8875  eval: -0.33286, -0.017533, -0.12398, -0.1242  evec 1: 0.54987 0.54987 0.30325 0.55074  evec 2: 0.41484 0.41484 -0.69627 0.41355  evec 3: 0.70711 -0.70711 2.5836e-016 -9.332e-014  evec 4: -0.40718 -0.40718 -0.00052758 0.81756  Classification:: STABLE</p> <p>fp 8:: <math>X_1, X_2, X_3, X_4</math>: 0.84, 0.84, 0.365, 0.84  eval: -0.35629, -0.11062, 0.014198, -0.11062  evec 1: 0.55004 0.55004 0.3039 0.55004  evec 2: 0.8165 -0.40825 -1.2895e-016 -0.40825  evec 3: 0.41406 0.41406 -0.69689 0.41406  evec 4: 0.022475 -0.71808 -3.7358e-018 0.6956  Classification:: SADDLE</p> <p>fp 9:: <math>X_1, X_2, X_3, X_4</math>: 0.685, 0.685, 0.6875, 0.6875  eval: -0.3987, -0.04637, -0.04702, -0.047667  evec 1: -0.49908 -0.49908 -0.50092 -0.50092  evec 2: -0.70711 0.70711 -3.6146e-014 -3.6298e-014  evec 3: 0.4988 0.4988 -0.5012 -0.5012  evec 4: -4.3695e-015 -1.3109e-014 -0.70711 0.70711  Classification:: STABLE</p>
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**Supplementary Table 6**

$$\begin{aligned}
dX_1/dt &= -kdegX_1 * X_1 + t_1 * mRNAX_1 \\
dX_2/dt &= -kdegX_2 * X_2 + t_2 * mRNAX_2 \\
dX_3/dt &= -kdegX_3 * X_3 + t_3 * mRNAX_3 \\
dX_4/dt &= -kdegX_4 * X_4 + t_4 * mRNAX_4 \\
dmRNAX_1/dt &= -kdegmRNA * mRNAX_1 + \\
&\quad (a * (X_1^n) / (S^n + X_1^n)) + \quad b * b_{common} * S^n / (S^n + X_2^n) + \\
&\quad (b * b_{31} * S^n) / (S^n + X_3^n) + \quad (b * b_{41} * S^n) / (S^n + X_4^n) \\
dmRNAX_2/dt &= -kdegmRNA * mRNAX_2 + \quad (a * (X_2^n) / (S^n + X_2^n)) + \\
&\quad b * S^n / (S^n + X_1^n) + \quad (b * b_{common} * S^n) / (S^n + X_3^n) + \\
&\quad (b * b_{common} * S^n) / (S^n + X_4^n) \\
dmRNAX_3/dt &= -kdegmRNA * mRNAX_3 + \\
&\quad (a * (X_3^n) / (S^n + X_3^n)) + \quad b * b_{common} * S^n / (S^n + X_1^n) + \\
&\quad (b * b_{23} * S^n) / (S^n + X_2^n) + \quad (b * b_{common} * S^n) / (S^n + X_4^n) \\
dmRNAX_4/dt &= -kdegmRNA * mRNAX_4 + \\
&\quad (a * (X_4^n) / (S^n + X_4^n)) + \quad b * b_{common} * S^n / (S^n + X_1^n) + \\
&\quad (b * b_{24} * S^n) / (S^n + X_2^n) + \quad (b * b_{34} * S^n) / (S^n + X_3^n)
\end{aligned}$$

Supplementary Table 7

fp 1::  $X_1, X_2, X_3$ : 0.60712, 0.79531, 0.41236  
eval: -3.1484, -0.82596, 0.49958  
Classification:: SADDLE

fp 2::  $X_1, X_2, X_3$ : 0.81099, 0.87701, 0.1958  
eval: -2.6527, -1.2484, -0.73806  
Classification:: STABLE

fp 3::  $X_1, X_2, X_3$ : 0.11956, 0.88105, 0.88781  
eval: -2.4361, -1.4283, -1.2377  
Classification:: STABLE

**Supplementary Table 8**

fp 1::  $X_1, X_2, X_3$ : 0.85442, 0.87433, 0.17654  
eval: -2.6469, -1.215, -0.93199  
Classification:: STABLE

fp 2::  $X_1, X_2, X_3$ : 0.59649, 0.71206, 0.49698  
eval: -3.36, -0.42794, 0.36842  
Classification:: SADDLE

fp 3::  $X_1, X_2, X_3$ : 0.60551, 0.42034, 0.7876  
eval: -3.2468, -0.58087, 0.36465  
Classification:: SADDLE

fp 4::  $X_1, X_2, X_3$ : 0.75641, 0.21416, 0.89035  
eval: -2.779, -1.0693, -0.6225  
Classification:: STABLE

fp 5::  $X_1, X_2, X_3$ : 0.15849, 0.87096, 0.87839  
eval: -2.5902, -1.1116, -1.2059  
Classification:: STABLE

**Supplementary Table 9**

fp 1::  $X_1, X_2, X_3$ : 0.6857, 0.68647, 0.68503  
eval: -0.39905,  
-0.0027162+0.076273i,  
-0.0027162-0.076273i  
evec 1: 0.57716  
0.57816  
0.57672  
evec 2: -0.28733-0.49944i  
0.57858+0i  
-0.2901+0.49909i  
evec 3: -0.28733+0.49944i  
0.57858+0i  
-0.2901-0.49909i  
Classification:: STABLE SPIRAL (see text)

**Supplementary Table 10**