

Supplement: Optimal parameter values for control of gene regulation.

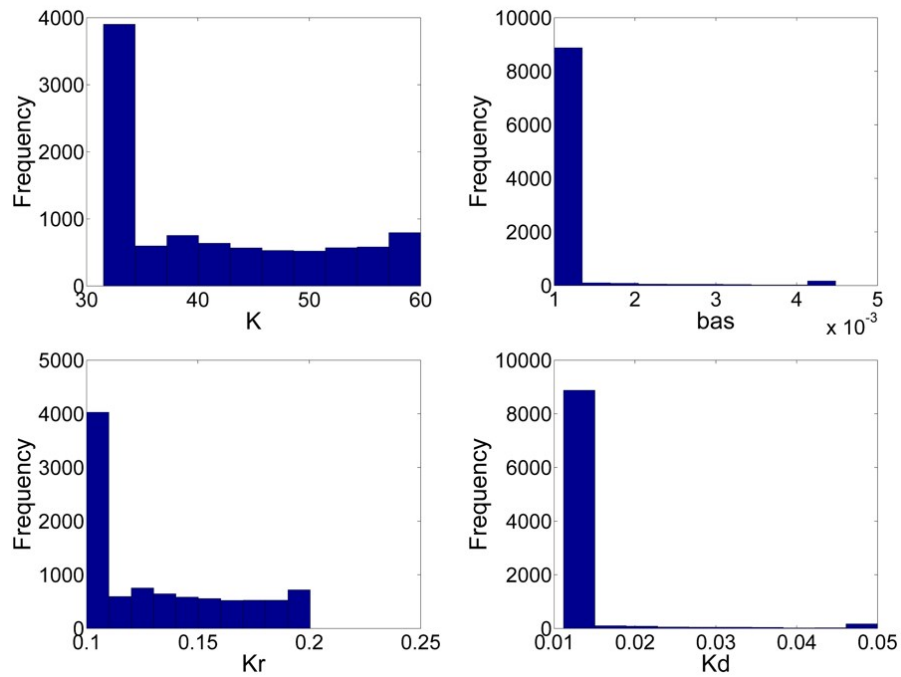
R G Brajesh, Nikhil Raj, and Supreet Saini*

Department of Chemical Engineering, Indian Institute of Technology Bombay

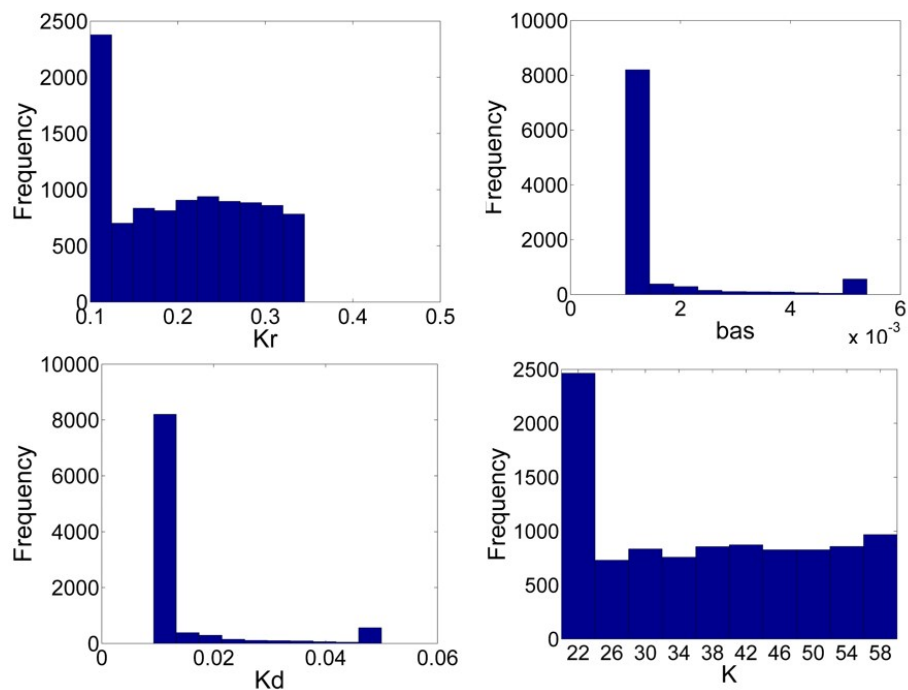
Powai, Mumbai – 400 076, India

*Email: saini@che.iitb.ac.in, Phone: 91 22 2576 7216

A - Benefit Curve (b)

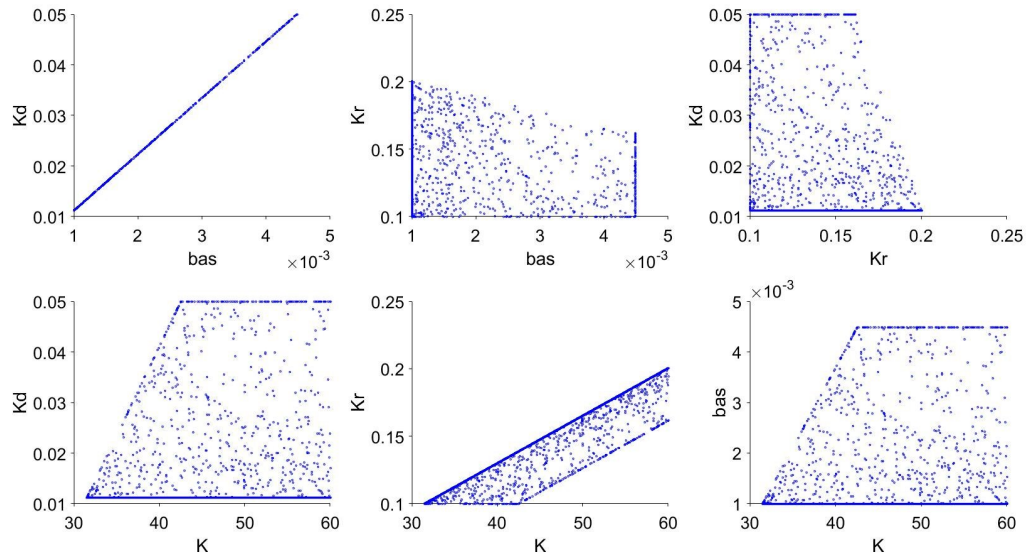


B - Benefit Curve (c)

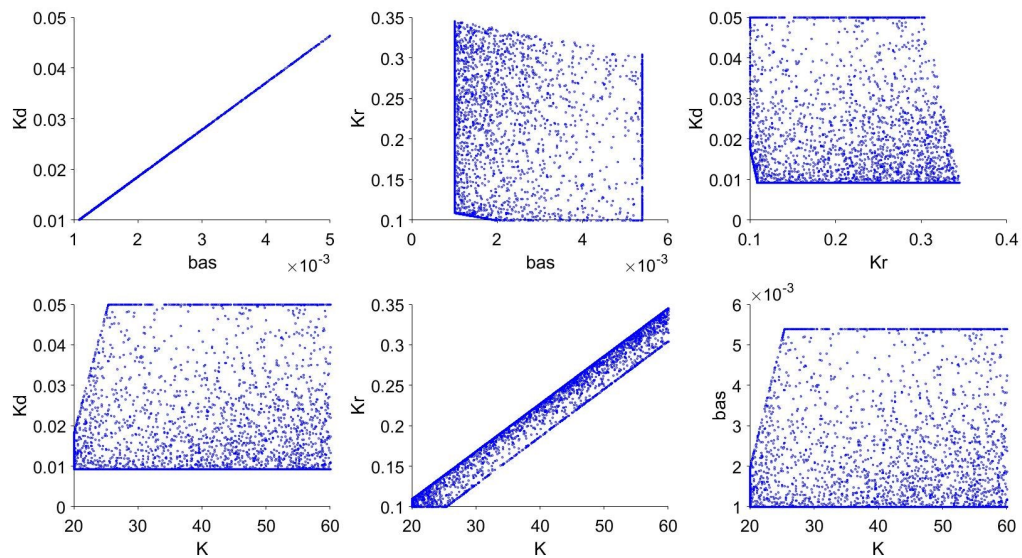


Supplementary Figure S1. Frequency distribution of optimal parameter sets. Frequency distribution of each of the six parameters (obtained from independent runs of NLP solver) that define performance of network 1A and benefit curve (b) and (c).

A – Benefit curve (b)

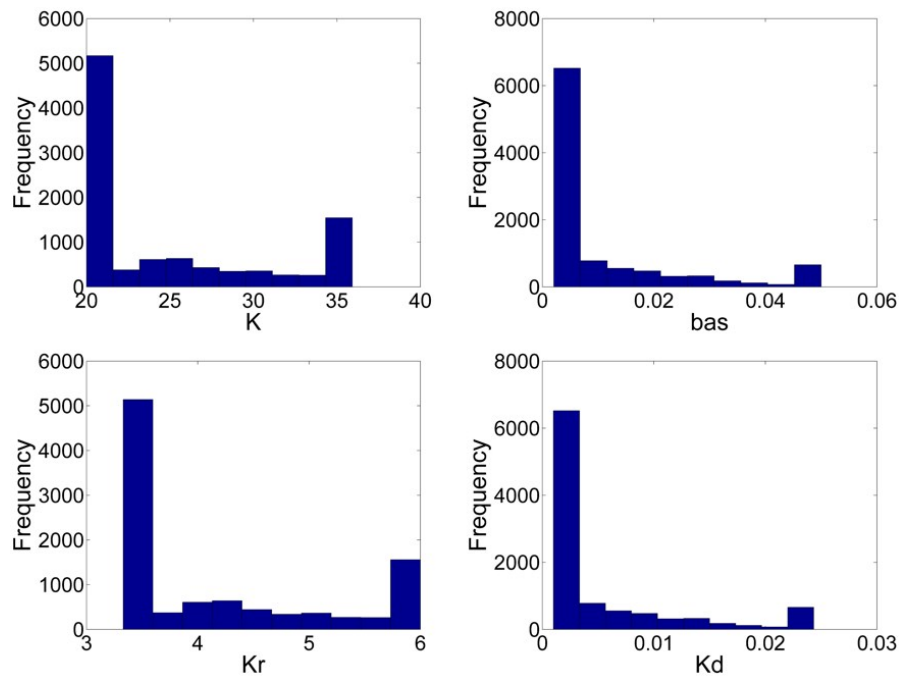


B – Benefit curve (c)

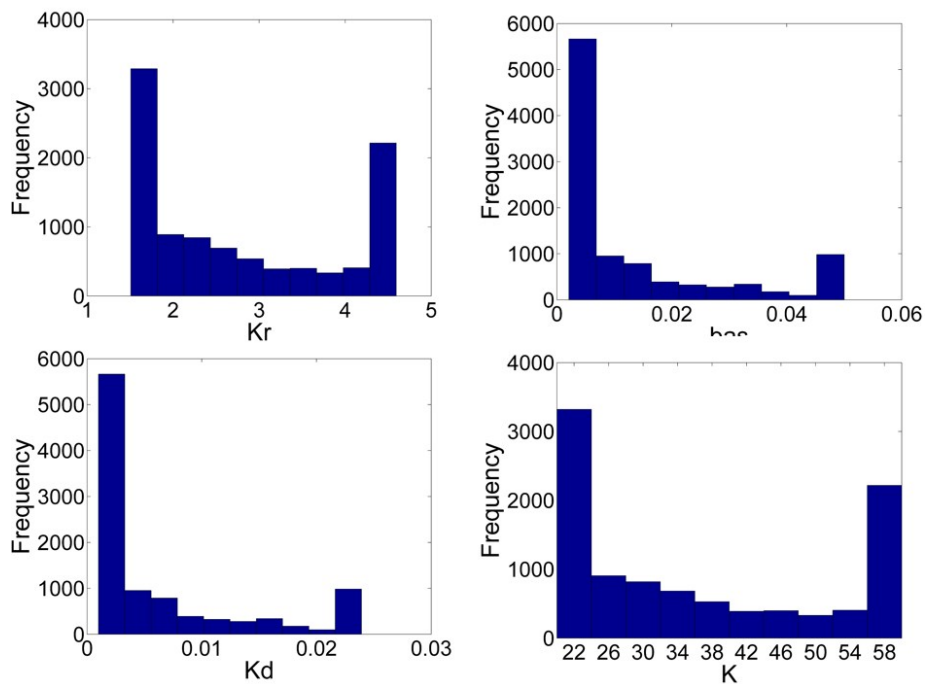


Supplement Figure S2. Pair wise analysis of biochemical parameters of activator topology (1A) for benefit curve (b) and (c). Pairwise analysis of basal expression of regulator, regulator degradation rate, rate of conversion of R to R* and rate of conversion of R* to R. Basal regulator expression and its degradation rate, and rate of conversion of R to R* and rate of conversion of R* to R, observed as highly correlated. Other parameters pairs does not show any specific correlations.

A - Benefit curve (b)

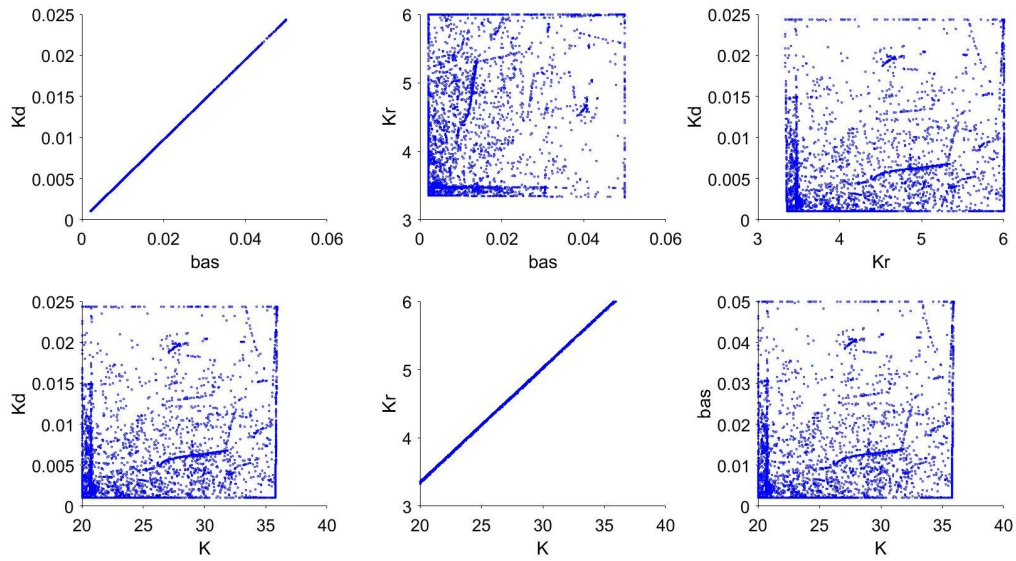


B – Benefit curve (c)

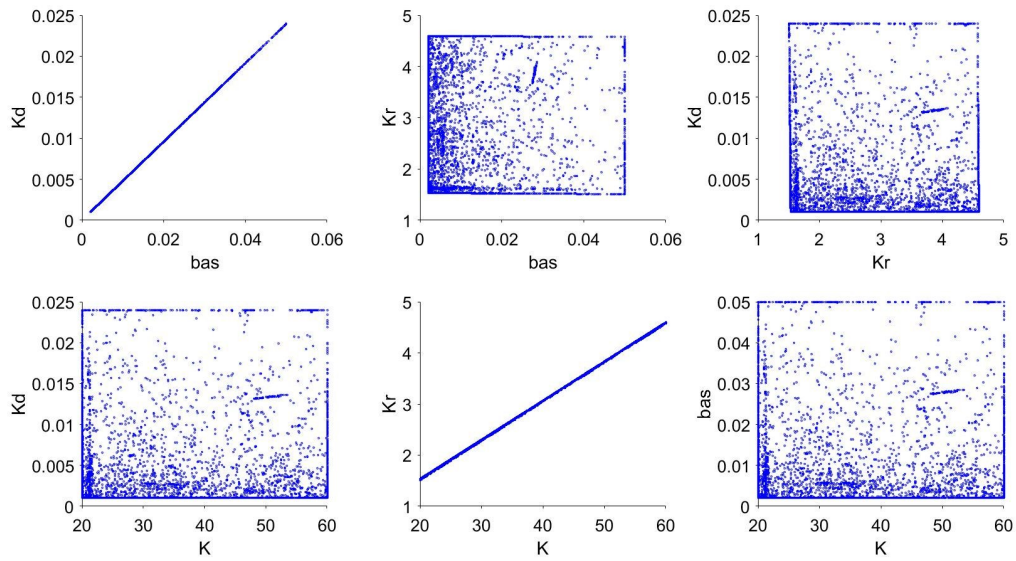


Supplementary Figure S3. Frequency distribution of optimal parameter sets.Frequency distribution of each of the six parameters (obtained from independent runs of NLP solver) that define performance of network 1B and benefit curve (b) and (c).

A – Benefit curve (b)



B – Benefit curve (c)



Supplement Figure S4. Pair wise analysis of biochemical parameters of repressor topology (1B) for benefit curve (b) and (c). Pairwise analysis of basal expression of regulator, regulator degradation rate, rate of conversion of R to R^* and rate of conversion of R^* to R . Basal regulator expression and its degradation rate, and rate of conversion of R to R^*

and rate of conversion of R^* to R , observed as highly correlated. Other parameters pairs does not show any specific correlations.

Supplementary Table T1: Pairwise correlation-coefficients for parameters for topology in Figure 1A and benefit curves (b) and (c). [Correlations highlighted in green are statistically significant]

A -Benefit curve (b)

	<i>k</i>	<i>Bas</i>	<i>k_r</i>
<i>k</i>			
<i>bas</i>	0.2010		
<i>k_r</i>	0.9840	0.0235	
<i>k_d</i>	0.2010	1.00	0.0235

B - Benefit curve (c)

	<i>k</i>	<i>Bas</i>	<i>k_r</i>
<i>k</i>			
<i>bas</i>	0.2145		
<i>k_r</i>	0.9999	0.2040	
<i>k_d</i>	0.2145	1.00	0.2040

Supplementary Table T2: Pairwise correlation-coefficients for parameters for topology in Figure 1B and benefit curves (b) and (c). [Correlations highlighted in green are statistically significant]

A - Benefit curve (b)

	<i>k</i>	<i>bas</i>	<i>k_r</i>
<i>k</i>			
<i>bas</i>	0.4138		
<i>k_r</i>	1.000	0.4080	
<i>k_d</i>	0.4138	1.000	0.4080

B - Benefit curve (c)

	<i>K</i>	<i>Bas</i>	<i>k_{rev}</i>
<i>K</i>			
<i>bas</i>	-0.2173		
<i>k_{rev}</i>	1.000	-0.2174	
<i>kd</i>	-0.2173	1.000	-0.2174