```
% sanity_check.m
```

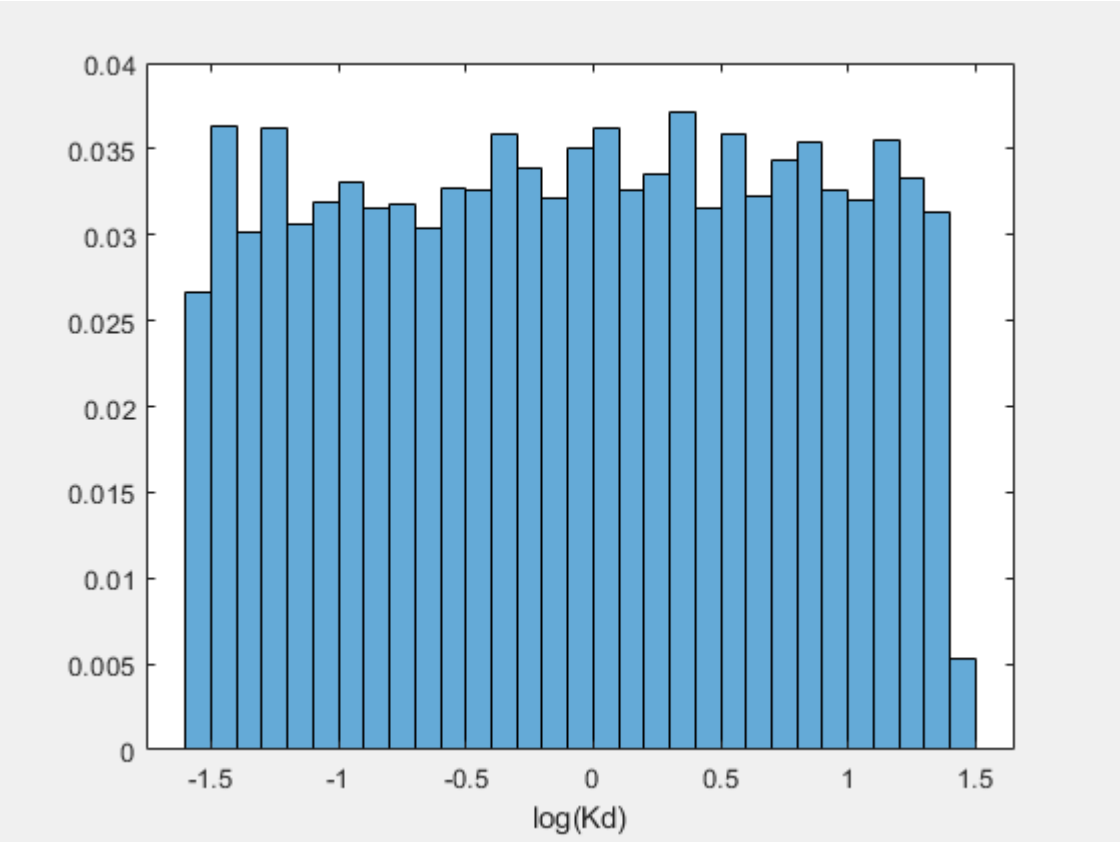
Sanity check

```
clear;
clc;
```

```
%%  sampling parameter
Rhythmic_mRNA_model = bbModel(@Sarah_Rhythmic_mRNA,5,3,'OutputType',[0 0 0]);

p = 4; % group number
q = 10; % group size
d = 5; % number of parameters
index = 2; % the ith parameter

% create parameter distribution
size = 10000;

amp_pd = makedist('Uniform','lower',0,'upper',1);
phase_pd = makedist('Uniform','lower',0,'upper',24);

Kd_pd_log= makedist('Uniform','lower',-1.58,'upper',1.415);
Kd_pd = 10.^random(Kd_pd_log,[size,1]);

params = {amp_pd phase_pd Kd_pd amp_pd phase_pd};
```

Histogram of parameter Kd

```
f = figure;
set(f, 'Visible', 'on');
histogram(log10(Kd_pd),'Normalization','probability')
xlabel('log(Kd)')
```



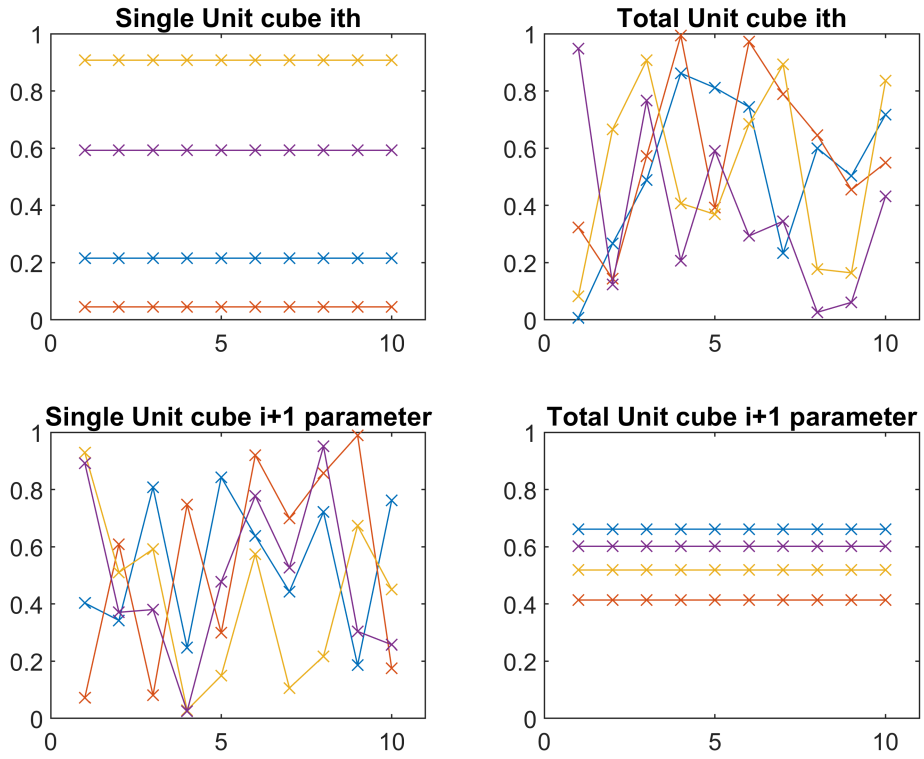
Parameter sampling

Unit cube

Single unit cube correspopnds to the parameter samples for single Sobol indices calculation, where the ith parameter values are fixed within each group and other parameter values unfixed. All parameter values are varied across groups (indicated by different colors).

```
[SingleCube,TotalCube] = generate_Nested_cube(p,q,d,index);

figure;
for j=1:p
   subplot(2,2,1)
   plot(1:q,SingleCube(j,:,index)','-x');
   hold on;
   xlim([0 q+1]);
   ylim([0 1])
   title('Single Unit cube ith')
end
hold off;


for j=1:p
   subplot(2,2,2)
   plot(1:q,TotalCube(j,:,index)','-x');
```

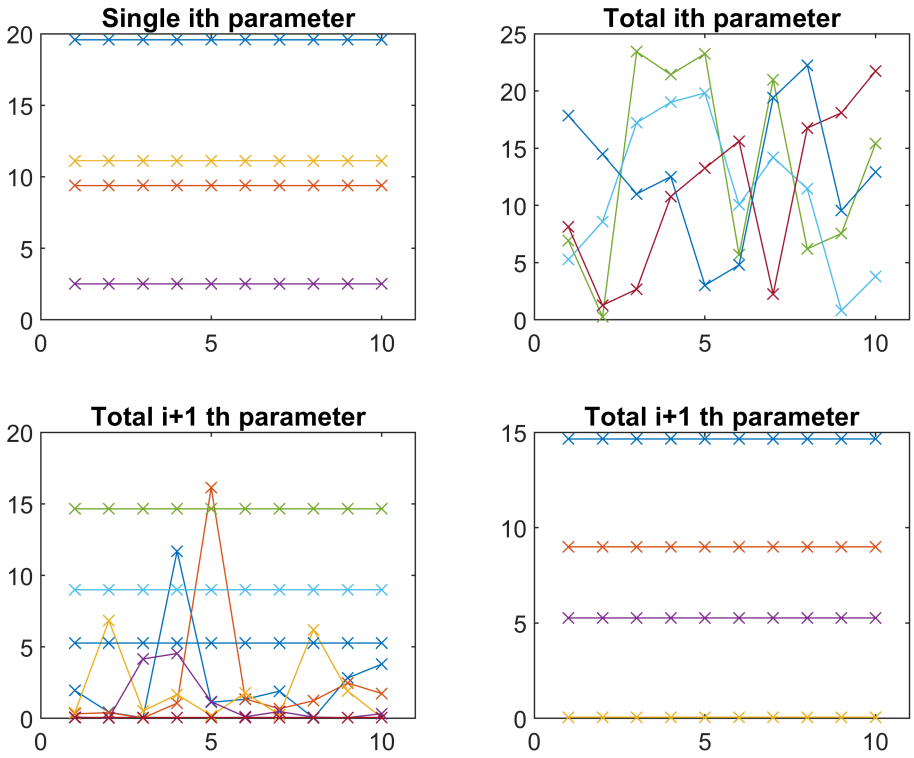
```
    hold on;
    xlim([0 q+1]);
    ylim([0 1])
    title('Total Unit cube ith')
end
hold off;

for j=1:p
    subplot(2,2,3)
    plot(1:q,SingleCube(j,:,index+1)','-x');
    hold on;
    xlim([0 q+1]);
    ylim([0 1])
    title('Single Unit cube i+1 parameter')
end
hold off;

for j=1:p
    subplot(2,2,4)
    plot(1:q,TotalCube(j,:,index+1)','-x');
    hold on;
    xlim([0 q+1]);
    ylim([0 1])
    title('Total Unit cube i+1 parameter')
end
hold off
```



Parameter space

```
[SinglePar,TotalPar] = generate_Nested_Parameter(params,p,q,d,index);

figure;
for j=1:p
   subplot(2,2,1)
   plot(1:q,SinglePar(j,:,index)','-x');
   hold on;
   xlim([0 q+1]);
   title('Single ith parameter')


   subplot(2,2,2)
   plot(1:q,TotalPar(j,:,index)','-x');
   hold on;
   xlim([0 q+1]);
   title('Total ith parameter')

   subplot(2,2,3)
   plot(1:q,SinglePar(j,:,index+1)','-x');
   hold on;
   xlim([0 q+1]);
   title('Total i+1 th parameter')

   subplot(2,2,4)
   plot(1:q,TotalPar(j,:,index+1)','-x');
   hold on;
   xlim([0 q+1]);
   title('Total i+1 th parameter')
end
hold off;



for j=1:p
   subplot(2,2,2)
   plot(1:q,TotalPar(j,:,index)','-x');
   hold on;
   xlim([0 q+1]);
   title('Total ith parameter')
end
hold off;


for j=1:p
   subplot(2,2,3)
   plot(1:q,TotalPar(j,:,index+1)','-x');
   hold on;
   xlim([0 q+1]);
   title('Total i+1 th parameter')
end
```

```
hold off;
```


Single ith parameter
Total ith parameter
Total i+1 th parameter
Total i+1 th parameter