% This file is for getting samples for ISI, spike duration and amplitude from the simulated data

% this can be used for both 6-state and 2-state models

clear all

format long

ISI=[]; % interspike interval vector

SD=[]; % spike duration vector

c\_am=[]; % spike amplitude vector

% You need to load one MAT file here for following sampling and analysis

% e.g. load('Stochastic\_model\_2state\_IP3R\_model\_IP3\_150nM\_total\_400s\_smallversion.mat')

bsl=0.097; % baseline can vary and is obtained from the time course of simulated calcium trace

bsl=bsl/(bsl+0.17)\*2.7;

Fr=c./(c+0.17)\*2.7; % convert [Ca2+] to fluorescence ratio

Fmax=max(Fr); % maximum of spike peak values

thrdL=(Fmax-bsl)\*0.2+bsl; % setting low threshold

thrdH=(Fmax-bsl)\*0.5+bsl; % setting high threshold

F=heaviside(Fr-thrdL);

F1=F(2:end)-F(1:end-1);

tindex=1:length(F1);

Fs=tindex.\*heaviside(F1-0.1);

Fe=tindex.\*heaviside(-F1-0.1);

Fs(abs(Fs) <= 0.1) = [];

Fe(abs(Fe) <= 0.1) = [];

spikestart=[]; % spike start index vector

spikeend=[]; % spike end index vector

peakind=[]; % spike peak index vector

for i=1:(length(Fe))

part=[Fs(i):Fe(i)];

[peak npeak]=max(Fr(part));

if peak > thrdH

cpeak=max(c(part));

c\_am=[c\_am cpeak];

spikestart=[spikestart Fs(i)];

spikeend=[spikeend Fe(i)];

peakind=[peakind Fs(i)+npeak-1];

end

end

for i=1:length(spikeend)

SD=[SD time(spikeend(i))-time(spikestart(i))];

end

for i=1:(length(spikeend)-1)

ISI=[ISI time(spikestart(i+1))-time(spikeend(i))];

end

% show results

mean(ISI)

std(ISI)

length(ISI)

mean(SD)

std(SD)

length(SD)

mean(c\_am)

std(c\_am)

length(c\_am)