

Advanced Data Analysis - How to generate a TODP, TDP, Histogram, Etc

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Histogram Generation:

Correcting Blinking, Lifetime Optimization and Photobleaching

1. Take interval files and convert them to vbFRET inputs
(using conversion code found in [Appendix A](#))
2. Drag interval files for “Donor” and “Acceptor” into MatLab
3. Alternately use “Load C:\Users\deciantis\Documents\XYZ_FRET_Interval.mat” & “Load C:\Users\deciantis\Documents\XYZ_Cy3_Interval.mat”
 - a. Rename “Interval” files to “Acceptor” or “Donor” in MatLab “Workspace” window on the right before adding second file
4. Copy and execute code from [Appendix A](#)
 - a. Only want to extract and convert frames when Green laser is on (e.g. 10-990)
 - b. Change # of frames to N (e.g. $N = \{\text{last frame} - \text{first frame} + 1\} = \{990 - 10 + 1\} = 981$)
 - c. If a Matlab generates an error, it usually is because # of frames is wrong
5. Save “Data” for input into vbFRET
 - a. “Data” file contains donor (Cy3) intensity in column 1 and acceptor (Cy5) intensity in column 2
 - b. Get rid of blinking by highlighting intensities for both columns where the fluors have bleached and press delete. This leaves 0s in both columns for that range. vbFRET needs the same length (981 total frames) for each trace, but stitches them together and ignores the 0s.
 - c. Use a fresh vbFRET window to [remove photobleaching](#) (do not get rid of blinking as for a histogram because it will introduce false transitions).
 - d. The folder “vbfret_nov12” needs to be Added with Subfolders using “Set Path”
 - e. Type “vbFRET” in “Command Window” of MatLab to launch vbFRET
 - i. Select “File” → “Load Data” → “Add Files” → Select your file → “Load Data”
 - f. Select “Traces” on top Menu of vbFRET, then select “Remove Photobleaching”
 - g. The “Debleach Traces” window will open
 - h. Do not change any variables (i.e. 1D FRET, 0.1, 2, 25)
 - i. Select the “Remove Photobleaching!” button
 - j. Select “File” → “Save Data”
 - k. An “Untitled” Window will open
 - l. Select “Save Raw Data” from the top pulldown option
 - m. Save as vbfret_DATE_exp#_blinkcorrected.mat by right clicking on “Data” file in right hand “Workspace” window in Matlab and select “SaveAs” – this will be your vbFRET input file
 - n. Use vbFRET to save raw data – FRET variable in matlab (just drag file into MatLab)
 - i. `list= vertcat(FRET{:, :});` combines all the FRET values into one list
 - ii. `y=histc(list,[0:0.02:1.2]);`
 - iii. `x=[0.01:0.02:1.21];`
 - o. Use “cftool” (curvefit tool) to plot a histogram
 - p. Enter x & y values into pull down menus for X&Y
 - q. Change the equation pulldown from “Polynomial” to “Gaussian”

- r. Can change “Number of Terms” pulldown to change order of the Gaussian
- s. Can select “Fit Options” to change value b1 or b2 to help center on peaks if you are not getting a very good fit
- t. Copy out “Results” equation into a Word or Powerpoint file
- u. To save histogram data select “File” from top menu, select “Generate Code”
- v. Cut code form “%CREATEFIT(X,Y)” to the end and paste into “Command Window” hit enter to execute
- w. You can change to display as histogram, change color, grid properties, etc.
- x. You can save just the figure by selecting “file” and “save as” and save it as a matlab figure, .bmp, .png, or .emf (which retains most data)
- y. You can save all the histogram list data by selecting the dropdown next to “Workspace” and saving as “date_histogram_EXP.mat”

The screenshot shows the Curve Fitting Tool window with the following details:

- Fit name:** untitled fit 1
- X data:** x
- Y data:** y
- Z data:** (none)
- Weights:** (none)
- Fit type:** Gaussian
- Number of terms:** 2
- Equation:** $a1 \cdot \exp(-((x-b1)/c1)^2) + a2 \cdot \exp(-((x-b2)/c2)^2)$
- Center and scale:**
- Auto fit:**
- Buttons:** Fit, Stop, Fit Options...

Results:

General model Gauss2:
 $f(x) = a1 \cdot \exp(-((x-b1)/c1)^2) + a2 \cdot \exp(-((x-b2)/c2)^2)$
 Coefficients (with 95% confidence bound):
 a1 = 1414 (1265, 1564)
 b1 = 0.7446 (0.7381, 0.7512)
 c1 = 0.07564 (0.06642, 0.08486)
 a2 = 4790 (4653, 4927)
 b2 = 0.2462 (0.2441, 0.2483)
 c2 = 0.0899 (0.08693, 0.09286)

Goodness of fit:
 SSE: 9.638e+05
 R-square: 0.9903

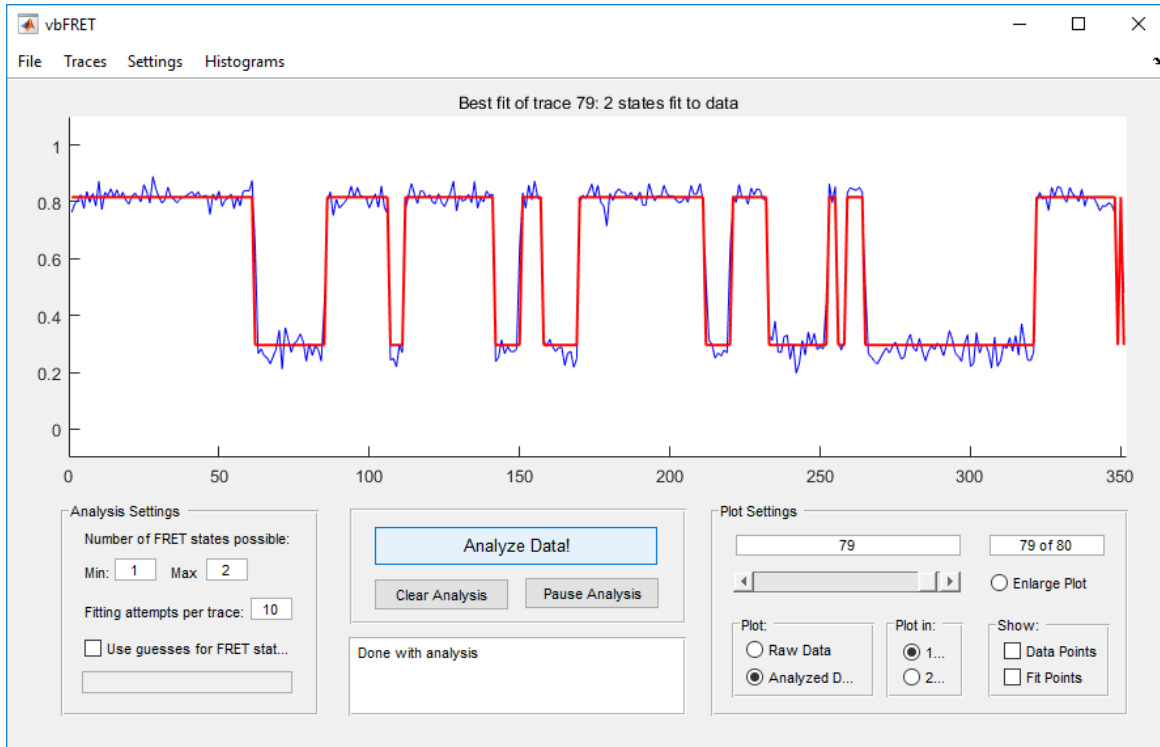
Table of Fits:

Fit name	Data	Fit type	SSE	R-square	DFE	Adj R-sq	RMSE	# Coeff	Validation ...	Validation ...	Validation ...
untitled f...	y vs. x	gauss2	9.6384e+05	0.9903	55	0.9895	132.3797	6			

Using Hammy to HMM fit a stitched data set

Correcting Blinking, Lifetime Optimization and Photobleaching

1. Convert intervals file to vbFRET file as in Histogram section (Steps X-Y)
2. Load vbFRET_input file into vbFRET as before
3. Optimize traces for lifetime analysis - cannot remove photobleaching as with Histogram generation above, because it will stitch together segments and give falsely extended lifetimes.
 - a. Delete everything before or after blinking events that bracket an active sequence of transitions, leaving the longest stretch of continuous non-blinking data.
 - b. N.B. Matlab2016a sometimes limits a Data file to displaying only 12-24 columns of data. All data is present, just not displayed, this can be worked around in several ways, you can create a "data1" where all of the data is transposed and then reconvert at the end. I have found that by clicking on the "Transpose" function under Matlab's "Variable" tab several times it will eventually display all columns of data. Your Mileage May Vary.
 - c. Save "data" by right clicking on "Data" file in right hand "Workspace" window in Matlab and select "SaveAs" - title this "vbFRET_Lifetime_Optimized_date_exp.mat" this will be your next vbFRET input file
4. Use a fresh vbFRET window to remove photobleaching (do not get rid of blinking as for a histogram because it will introduce false transitions).
 - a. The folder "vbfret_nov12" needs to be Added with Subfolders using "Set Path"
 - b. Type "vbFRET" in "Command Window" of MatLab to launch vbFRET
 - i. Select "File" → "Load Data" → "Add Files" → Select your file → "Load Data"
 - c. Select "Traces" on top Menu of vbFRET, then select "Remove Photobleaching"
 - d. The "Debleach Traces" window will open
 - i. Do not change any variables (i.e. 1D FRET, 0.1, 2, 25)
 - ii. Select the "Remove Photobleaching!" button
 - e. Select "File" → "Save Data"
 - f. An "Untitled" Window will open
 - i. Select "Save Raw Data" from the top pulldown option
 - ii. Type your new file name, "vbFRET_Lifetime_Optimized_photobleach_corrected_date_exp.mat" in the box that has "Save Name"
 - iii. Select the "Save" button to save



debleachTraces

Photobleach Removal Settings

Photobleach identification method:
1D FRET

Truncate data when FRET exceeds 1 or 0 by more than:
0.1

Smooth trace before looking for photobleaching (does not affect other data analysis):

Smooth over 2 steps.

Truncate an extra 2 steps.

Minimum trace length:
25
(Traces shorter than this value will be not be used in further analysis.)

Remove Photobleaching!

Close

Save Settings

Restore Default Settings

Converting vbFRET file to HaMMY file

Stitching traces together first before fitting

1. Load rawdata file from vbFRET into matlab (corrected for photobleaching)

```
stitched1=[];
stitched1=vertcat(data{1,:});
In Workspace open stitched one in variable editor and insert blank column in column 1
time=(0:1:length(stitched1)-1); time=time';
stitched1(:,1)=time;
UserFile = 'C:\Users\deciantis\Desktop\stitched\stitched1.dat';save(UserFile, 'stitched1', '-ascii');
```

Make individual hammy files for each trace

2. Load rawdata file from vbFRET into matlab (corrected for photobleaching)
3. Enter in the following to obtain time variable for each trace:

```
time=cell(1,length(data));
for i=1 : length(data)
time{i}=(0:1:length(data{i})-1)';
end
```

4. Generate hammy input file using the following code:

```
hammy_input=cell(1,length(data));
for i = 1:length(data)
hammy_input{i}(:,3)=data{i}(:,2);
hammy_input{i}(:,2)=data{i}(:,1);
hammy_input{i}(:,1)=time{i};
end
```

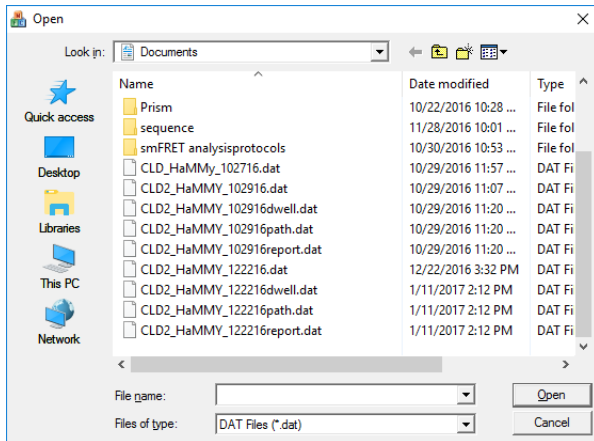
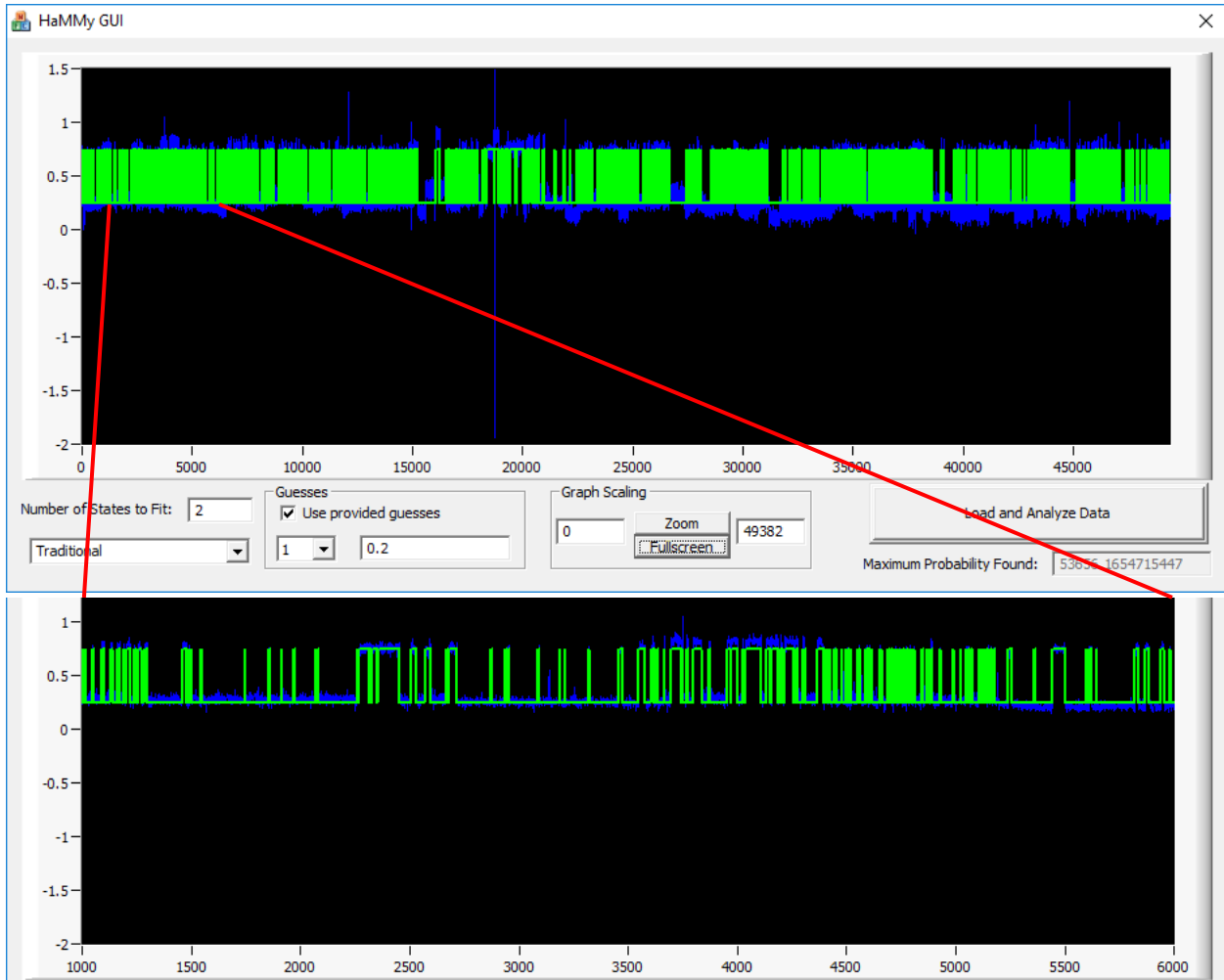
5. Save individual traces as .dat files
 - a. N.B. HaMMY does not recognize .mat files, so everything needs to be saved as .dat files. These files need to be saved from the "Command Window" and must be specified to have ascii characters to be recognized by HaMMY

```
mol3=hammy_input{1,3}; UserFile =
'C:\Users\deciantis\Desktop\hammy_input_files\mol3.dat';save(UserFile, 'mol3', '-ascii');
```

6. Repeat saving with every molecule See [Appendix B](#) for code to copy

It's HaMMY Time

1. You can load either the stitched or individual molecule .dat files into HaMMY
 - a. Use the stitched file to generate a global fit and for lifetime analysis - it is important for datasets with overlapping states to use the stitched data for lifetime analysis because it will assign a single number to each lifetime that we can easily access later.
 - b. Use the individual files to generate fits for each molecule. Idealized states from each molecule can then be combined into a HaMMY histogram (generally need many hundreds of molecules for this type of analysis).
2. You will need to download HaMMY 4.0+ from the interwebs (search at Uofl CPLC, Github, or search Ha lab at Johns Hopkins) – Run HaMMY
 - a. HaMMY saves output files into the folder that the parent file was loaded from
 - b. Select from pull down menu “[traditional](#)”
 - c. Select estimated number of states for FRET (e.g. [2](#), [3](#), etc)
 - d. You can enter estimated values for each of the above states to help HMM start closer to estimated endpoints
 - e. Once run, HaMMY automatically generates fit states and generates output files
 - f. HaMMY outputs three files: Dwell, Path and Report
 - g. Load Files into MatLab
 - i. Either drag in files one at a time, or
 - ii. Type “`Load 'c:\filepath\filenameDwell.dat' -ascii`” ; same for “`...Path.dat`”
 - iii. Stitched Dwell files contain the dwell information for each transition with the following parameters:
 1. Column 1 = state before transition happened
 2. Column 2 = state after transition happened
 3. Column 3 = # of frames it was in state 1 before transition occurred
 - iv. Stitched Path contain the information for each transition with the following parameters:
 1. Column 1 = Frame #
 2. Column 2 = Cy3 intensity
 3. Column 3 = Cy5 Intensity
 4. FRET efficiency for this frame
 5. Fitted FRET efficiency for all cells in this trace in this state

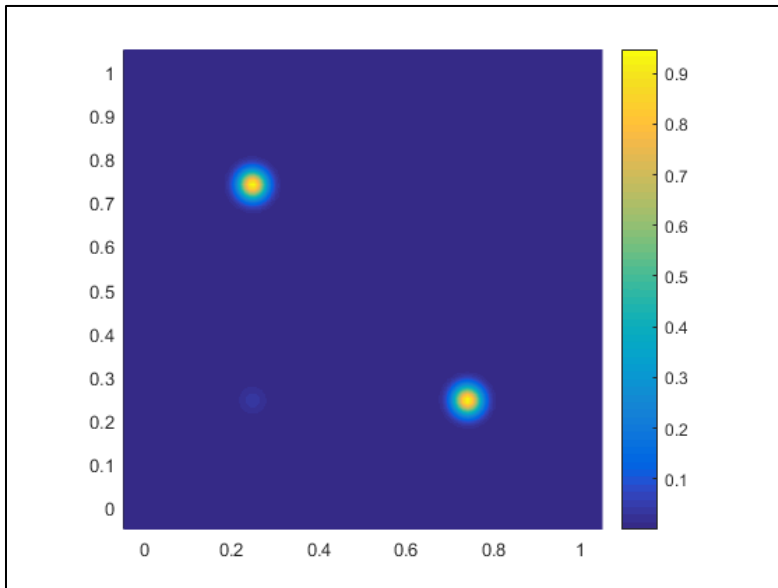


Unstitch traces and making a TODP

1. Load rawdata file saved from vbFRET into matlab
2. Make and save individual molecules with time, donor, acceptor format with the following code:

```
time=[0:1:length(data{1,#})-1];time=time';data2=[time(:,1),data{1,#}(:,1),data{1,#}(:,2)];UserFile = 'C:\Users\deciantis\Desktop\folder\mol#.dat';save(UserFile, 'data2', '-ascii');
```

 - ➔ Change the # to each molecule number (column number). Repeat for every molecule analyzed - see [Appendix C](#) for Code
3. Run the “[EmailSplitStitchedFiles.m](#)” code in matlab
4. Load the stitched path file Hammy spit out first
5. Select all the raw molecule data you just created
6. Name the files “[DATEunstitchedpath](#)”
7. Now you have analyzed path files split up into each molecule instead of one path file for a stitched dataset
8. Run the “[FindTransvbFRETDiagonal.m](#)” code in matlab
9. Select and load all the DATEunstirtchedpath files you just created
10. Type in name for output file when it prompts you (e.g. [DATEexp#TODP](#))
11. Standard deviation? Press enter
12. TODP? Press enter
13. TODP should be generated and displayed and can be saved from here



14. You can save the “[Dwells4.mat](#)” from the Matlab Workspace to save transitions and lifetime information. Each cell is a separate molecule and if you open the cell:
 - a. Column 1 is FRET efficiency before transition
 - b. Column 2 is FRET efficiency after transition
 - c. Column 3 is the number that type of transitions for that molecule
 - d. Columns 4- xx are the lifetimes (in frames) for each state (state corresponds to column 1)

Generate a list of dwell times from individual HaMMY fits

1. Load dwell files from hammy into matlab

```
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol1dwell.dat -ascii
```

See [Appendix D](#) for code to copy

2. Convert variables into a cell array

```
>> dwells{1,1}=mol1dwell;
```

See [Appendix E](#) for code to copy

Delete all columns that have nothing in them

Sort ones that start with low FRET state (column 1), add zeros above if they start with high FRET state

Also make the length of each cell even by adding rows of zeros

Find values corresponding to low and high FRET states (Only works for thresholding two states above and below 0.5):

```
lowFRETdwell=cell(1,length(dwells));
```

```
for i =1:length(dwells)
```

```
for L=length(dwells{i}{:,1})*0.5;
```

```
A=[ones(1,L); zeros(1,L)];
```

```
A=A(:);
```

```
logik=A(:,1)==1;
```

```
lowFRETdwell{i}=dwells{i}(logik,3);
```

```
end
```

```
end
```

```
highFRETdwell=cell(1,length(dwells));
```

```
for i =1:length(dwells)
```

```
for L=length(dwells{i}{:,1})*0.5;
```

```
A=[ones(1,L); zeros(1,L)];
```

```
A=A(:);  
logik=A(:,1)==0;  
highFRETdwell{i}=dwells{i}(logik,3);  
end  
end
```

```
for i =1:length(dwells)  
logik2=dwells{i}(:,1)>0.5==0;  
lowFRETdwell{i}=dwells{i}(logik2,3);  
end
```

```
for i =1:length(dwells)  
logik=dwells{i}(:,1)>0.5==1;  
highFRETdwell{i}=dwells{i}(logik,3);  
end
```

filter all high FRET state dwells:

```
list=[];list=vertcat(highFRETdwell{:}); list2=list>0; list3=list(list2);  
list_low=vertcat(lowFRETdwell{:}); list_low2=list_low>0;list_low3=list_low(list_low2);
```

Use exponential fitting commands in next section

Exponential Fitting Commands

```
load('C:\Users\deciantis\matlab\data\20140422_BBP_tRNAwash_RNAso1_12_50to300.mat')
```

```
cia=Intervals.CumulativeIntervalArray;
```

```
logik=cia(:,1)==1;
```

```
eventlength=cia(logik,5);
```

1. Single exponential fit:

```
y = fminsearch ('expfallone_mxl_2', [20],[],eventlength,0.25, 325)
```

```
thyme = [0:0.5:400];
```

```
tau = y; tm = 0.25; tx = 325; fcn = ( 1/( exp(-tm/tau) - exp(-tx/tau)) )*(1/tau)*exp(-thyme/tau);
```

```
N=histc(eventlength,[0:1:250]);
```

```
X=[0:1:250];
```

```
figure(1);plot(X,([N/1]/213),'x');
```

```
hold on
```

```
plot(thyme,fcn,'m');
```

```
single exponential bootstrap: bts=btstrp_exp1(100,4,eventlength,tm,tx); 100=iterations, 4=tau,y
```

```
dfittool to look at distribution/standard deviation
```

2. Double exponential:

```
l = fminsearch('expfalltwo_mxl',[0.81 4 10],[],eventlength,tm,tx)
```

splits out 'a' (not amplitude), 'tau1' and 'tau2'

adjust inputs so that output = $1 < a < 0.5$ so that $0 < \text{amp} < 1$

$$\text{amp} = (1/a - 1)^{1/2}$$

```
amp=0.484; tau1=4.0855; tau2=4.0855; fcn2=1/ ( amp*(exp(-tm/tau1)-exp(-tx/tau2)) + (1-amp)*(exp(-tm/tau2)-exp(-tx/tau2)) )*( amp/tau1 *exp(-thyme/tau1)+(1-amp)/tau2 *exp(-thyme/tau2) );
```

```
figure(8);plot(X,([N/1]/213),'x');
```

```
hold on
```

```
plot(thyme,fcn2,'m');
```

double exponential bootstrap:

change to log on y axis to see if it fits well

Determine Equilibrium Constants

Determining equilibrium constants by integrating under peaks in the histogram

Define lowFRET and highFRET equations from the coefficients determined in curve fitting

```
x = (0:0.000001:1);
```

```
lowFRET = a1*exp(-(x-b1)/c1).^2;
```

```
highFRET = a2*exp(-(x-b2)/c2).^2;
```

```
Z2 = trapz(highFRET);
```

```
Z = trapz(lowFRET);
```

```
ratio = Z2/Z;
```

LowFRET is sometimes fit to multiple peaks just add them like in curve fit.

TDP Files from HaMMy

You can also use HaMMy to generate traditional TDP files
by integrating under peaks in the histogram

Appendix A

```
frames = 981;

num_acceptors = size(Acceptor.AllTracesCellArray,1);

num_donors = size(Donor.AllTracesCellArray,1);

pairs = ones(min(num_acceptors, num_donors),2,frames);

%match donors and acceptors

matches = 0;

for i = 1:1:num_donors;

    curr_ID = Donor.AllTracesCellArray{i,2};

    for j = 1:1:num_acceptors;

        if curr_ID == Acceptor.AllTracesCellArray{j,2};

            matches = matches + 1;

            pairs(matches,1,:) = Donor.AllTracesCellArray{i,12}{10:990,2};

            pairs(matches,2,:) = Acceptor.AllTracesCellArray{j,12}{10:990,2};

        end

    end

end

for i=1:size(pairs,1)

    for j=1:size(pairs,3)

        data{1,i}{j,1}=pairs(i,1,j);

        data{1,i}{j,2}=pairs(i,2,j);

    end

end
```


Appendix B

```
mol1=hammy_input{1,1}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol1.dat';save(UserFile, 'mol1', '-ascii');  
mol2=hammy_input{1,2}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol2.dat';save(UserFile, 'mol2', '-ascii');  
mol3=hammy_input{1,3}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol3.dat';save(UserFile, 'mol3', '-ascii');  
mol4=hammy_input{1,4}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol4.dat';save(UserFile, 'mol4', '-ascii');  
mol5=hammy_input{1,5}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol5.dat';save(UserFile, 'mol5', '-ascii');  
mol6=hammy_input{1,6}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol6.dat';save(UserFile, 'mol6', '-ascii');  
mol7=hammy_input{1,7}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol7.dat';save(UserFile, 'mol7', '-ascii');  
mol8=hammy_input{1,8}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol8.dat';save(UserFile, 'mol8', '-ascii');  
mol9=hammy_input{1,9}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol9.dat';save(UserFile, 'mol9', '-ascii');  
mol10=hammy_input{1,10}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol10.dat';save(UserFile, 'mol10', '-ascii');  
mol11=hammy_input{1,11}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol11.dat';save(UserFile, 'mol11', '-ascii');  
mol12=hammy_input{1,12}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol12.dat';save(UserFile, 'mol12', '-ascii');  
mol13=hammy_input{1,13}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol13.dat';save(UserFile, 'mol13', '-ascii');  
mol14=hammy_input{1,14}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol14.dat';save(UserFile, 'mol14', '-ascii');  
mol15=hammy_input{1,15}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol15.dat';save(UserFile, 'mol15', '-ascii');  
mol16=hammy_input{1,16}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol16.dat';save(UserFile, 'mol16', '-ascii');  
mol17=hammy_input{1,17}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol17.dat';save(UserFile, 'mol17', '-ascii');  
mol18=hammy_input{1,18}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol18.dat';save(UserFile, 'mol18', '-ascii');  
mol19=hammy_input{1,19}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol19.dat';save(UserFile, 'mol19', '-ascii');
```

```
mol20=hammy_input{1,20}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol20.dat';save(UserFile, 'mol20', '-ascii');  
mol21=hammy_input{1,21}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol21.dat';save(UserFile, 'mol21', '-ascii');  
mol22=hammy_input{1,22}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol22.dat';save(UserFile, 'mol22', '-ascii');  
mol23=hammy_input{1,23}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol23.dat';save(UserFile, 'mol23', '-ascii');  
mol24=hammy_input{1,24}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol24.dat';save(UserFile, 'mol24', '-ascii');  
mol25=hammy_input{1,25}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol25.dat';save(UserFile, 'mol25', '-ascii');  
mol26=hammy_input{1,26}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol26.dat';save(UserFile, 'mol26', '-ascii');  
mol27=hammy_input{1,27}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol27.dat';save(UserFile, 'mol27', '-ascii');  
mol28=hammy_input{1,28}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol28.dat';save(UserFile, 'mol28', '-ascii');  
mol29=hammy_input{1,29}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol29.dat';save(UserFile, 'mol29', '-ascii');  
mol30=hammy_input{1,30}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol30.dat';save(UserFile, 'mol30', '-ascii');  
mol31=hammy_input{1,31}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol31.dat';save(UserFile, 'mol31', '-ascii');  
mol32=hammy_input{1,32}; UserFile =  
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mol33=hammy_input{1,33}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol33.dat';save(UserFile, 'mol33', '-ascii');  
mol34=hammy_input{1,34}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol34.dat';save(UserFile, 'mol34', '-ascii');  
mol35=hammy_input{1,35}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol35.dat';save(UserFile, 'mol35', '-ascii');  
mol36=hammy_input{1,36}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol36.dat';save(UserFile, 'mol36', '-ascii');  
mol37=hammy_input{1,37}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol37.dat';save(UserFile, 'mol37', '-ascii');  
mol38=hammy_input{1,38}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol38.dat';save(UserFile, 'mol38', '-ascii');  
mol39=hammy_input{1,39}; UserFile =  
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mol40=hammy_input{1,40}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol40.dat';save(UserFile, 'mol40', '-ascii');
```

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mol41=hammy_input{1,41}; UserFile =  
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mol42=hammy_input{1,42}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol42.dat';save(UserFile, 'mol42', '-ascii');  
mol43=hammy_input{1,43}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol43.dat';save(UserFile, 'mol43', '-ascii');  
mol44=hammy_input{1,44}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol44.dat';save(UserFile, 'mol44', '-ascii');  
mol45=hammy_input{1,45}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol45.dat';save(UserFile, 'mol45', '-ascii');  
mol46=hammy_input{1,46}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol46.dat';save(UserFile, 'mol46', '-ascii');  
mol47=hammy_input{1,47}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol47.dat';save(UserFile, 'mol47', '-ascii');  
mol48=hammy_input{1,48}; UserFile =  
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mol49=hammy_input{1,49}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol49.dat';save(UserFile, 'mol49', '-ascii');  
mol50=hammy_input{1,50}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol50.dat';save(UserFile, 'mol50', '-ascii');  
mol51=hammy_input{1,51}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol51.dat';save(UserFile, 'mol51', '-ascii');  
mol52=hammy_input{1,52}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol52.dat';save(UserFile, 'mol52', '-ascii');  
mol53=hammy_input{1,53}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol53.dat';save(UserFile, 'mol53', '-ascii');  
mol54=hammy_input{1,54}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol54.dat';save(UserFile, 'mol54', '-ascii');  
mol55=hammy_input{1,55}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol55.dat';save(UserFile, 'mol55', '-ascii');  
mol56=hammy_input{1,56}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol56.dat';save(UserFile, 'mol56', '-ascii');  
mol57=hammy_input{1,57}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol57.dat';save(UserFile, 'mol57', '-ascii');  
mol58=hammy_input{1,58}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol58.dat';save(UserFile, 'mol58', '-ascii');  
mol59=hammy_input{1,59}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol59.dat';save(UserFile, 'mol59', '-ascii');  
mol60=hammy_input{1,60}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol60.dat';save(UserFile, 'mol60', '-ascii');  
mol61=hammy_input{1,61}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol61.dat';save(UserFile, 'mol61', '-ascii');
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```
mol62=hammy_input{1,62}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol62.dat';save(UserFile, 'mol62', '-ascii');  
mol63=hammy_input{1,63}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol63.dat';save(UserFile, 'mol63', '-ascii');  
mol64=hammy_input{1,64}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol64.dat';save(UserFile, 'mol64', '-ascii');  
mol65=hammy_input{1,65}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol65.dat';save(UserFile, 'mol65', '-ascii');  
mol66=hammy_input{1,66}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol66.dat';save(UserFile, 'mol66', '-ascii');  
mol67=hammy_input{1,67}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol67.dat';save(UserFile, 'mol67', '-ascii');  
mol68=hammy_input{1,68}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol68.dat';save(UserFile, 'mol68', '-ascii');  
mol69=hammy_input{1,69}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol69.dat';save(UserFile, 'mol69', '-ascii');  
mol70=hammy_input{1,70}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol70.dat';save(UserFile, 'mol70', '-ascii');  
mol71=hammy_input{1,71}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol71.dat';save(UserFile, 'mol71', '-ascii');  
mol72=hammy_input{1,72}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol72.dat';save(UserFile, 'mol72', '-ascii');  
mol73=hammy_input{1,73}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol73.dat';save(UserFile, 'mol73', '-ascii');  
mol74=hammy_input{1,74}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol74.dat';save(UserFile, 'mol74', '-ascii');  
mol75=hammy_input{1,75}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol75.dat';save(UserFile, 'mol75', '-ascii');  
mol76=hammy_input{1,76}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol76.dat';save(UserFile, 'mol76', '-ascii');  
mol77=hammy_input{1,77}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol77.dat';save(UserFile, 'mol77', '-ascii');  
mol78=hammy_input{1,78}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol78.dat';save(UserFile, 'mol78', '-ascii');  
mol79=hammy_input{1,79}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol79.dat';save(UserFile, 'mol79', '-ascii');  
mol80=hammy_input{1,80}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol80.dat';save(UserFile, 'mol80', '-ascii');  
mol80=hammy_input{1,80}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol80.dat';save(UserFile, 'mol80', '-ascii');  
mol81=hammy_input{1,81}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol81.dat';save(UserFile, 'mol81', '-ascii');
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mol82=hammy_input{1,82}; UserFile =  
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mol83=hammy_input{1,83}; UserFile =  
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mol84=hammy_input{1,84}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol84.dat';save(UserFile, 'mol84', '-ascii');  
mol85=hammy_input{1,85}; UserFile =  
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mol86=hammy_input{1,86}; UserFile =  
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mol87=hammy_input{1,87}; UserFile =  
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mol88=hammy_input{1,88}; UserFile =  
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mol89=hammy_input{1,89}; UserFile =  
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mol90=hammy_input{1,90}; UserFile =  
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mol91=hammy_input{1,91}; UserFile =  
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mol92=hammy_input{1,92}; UserFile =  
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mol93=hammy_input{1,93}; UserFile =  
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mol94=hammy_input{1,94}; UserFile =  
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mol95=hammy_input{1,95}; UserFile =  
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mol96=hammy_input{1,96}; UserFile =  
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mol97=hammy_input{1,97}; UserFile =  
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mol98=hammy_input{1,98}; UserFile =  
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mol99=hammy_input{1,99}; UserFile =  
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mol100=hammy_input{1,100}; UserFile =  
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mol101=hammy_input{1,101}; UserFile =  
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mol102=hammy_input{1,102}; UserFile =  
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mol103=hammy_input{1,103}; UserFile =  
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mol105=hammy_input{1,105}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol105.dat';save(UserFile, 'mol105', '-ascii');  
mol106=hammy_input{1,106}; UserFile =  
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mol107=hammy_input{1,107}; UserFile =  
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mol108=hammy_input{1,108}; UserFile =  
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mol109=hammy_input{1,109}; UserFile =  
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mol110=hammy_input{1,110}; UserFile =  
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mol111=hammy_input{1,111}; UserFile =  
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mol112=hammy_input{1,112}; UserFile =  
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mol113=hammy_input{1,113}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol113.dat';save(UserFile, 'mol113', '-ascii');  
mol114=hammy_input{1,114}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol114.dat';save(UserFile, 'mol114', '-ascii');  
mol115=hammy_input{1,115}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol115.dat';save(UserFile, 'mol115', '-ascii');  
mol116=hammy_input{1,116}; UserFile =  
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mol117=hammy_input{1,117}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol117.dat';save(UserFile, 'mol117', '-ascii');  
mol118=hammy_input{1,118}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol118.dat';save(UserFile, 'mol118', '-ascii');  
mol119=hammy_input{1,119}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol119.dat';save(UserFile, 'mol119', '-ascii');  
mol120=hammy_input{1,120}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol120.dat';save(UserFile, 'mol120', '-ascii');  
mol121=hammy_input{1,121}; UserFile =  
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mol122=hammy_input{1,122}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol122.dat';save(UserFile, 'mol122', '-ascii');  
mol123=hammy_input{1,123}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol123.dat';save(UserFile, 'mol123', '-ascii');
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mol124=hammy_input{1,124}; UserFile =  
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mol125=hammy_input{1,125}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol125.dat';save(UserFile, 'mol125', '-ascii');  
mol126=hammy_input{1,126}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol126.dat';save(UserFile, 'mol126', '-ascii');  
mol127=hammy_input{1,127}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol127.dat';save(UserFile, 'mol127', '-ascii');  
mol128=hammy_input{1,128}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol128.dat';save(UserFile, 'mol128', '-ascii');  
mol129=hammy_input{1,129}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol129.dat';save(UserFile, 'mol129', '-ascii');  
mol130=hammy_input{1,130}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol130.dat';save(UserFile, 'mol130', '-ascii');  
mol131=hammy_input{1,131}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol131.dat';save(UserFile, 'mol131', '-ascii');  
mol132=hammy_input{1,132}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol132.dat';save(UserFile, 'mol132', '-ascii');  
mol133=hammy_input{1,133}; UserFile =  
'C:\Users\deciantis\Desktop\hammy_input_files\mol133.dat';save(UserFile, 'mol133', '-ascii');
```

Appendix C

```
time=[0:1:length(data{1,1})-1];time=time';data2=[time(:,1),data{1,1}(:,1),data{1,1}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol1.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,2})-1];time=time';data2=[time(:,1),data{1,2}(:,1),data{1,2}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol2.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,3})-1];time=time';data2=[time(:,1),data{1,3}(:,1),data{1,3}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol3.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,4})-1];time=time';data2=[time(:,1),data{1,4}(:,1),data{1,4}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol4.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,5})-1];time=time';data2=[time(:,1),data{1,5}(:,1),data{1,5}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol5.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,6})-1];time=time';data2=[time(:,1),data{1,6}(:,1),data{1,6}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol6.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,7})-1];time=time';data2=[time(:,1),data{1,7}(:,1),data{1,7}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol7.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,8})-1];time=time';data2=[time(:,1),data{1,8}(:,1),data{1,8}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol8.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,9})-1];time=time';data2=[time(:,1),data{1,9}(:,1),data{1,9}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol9.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,10})-1];time=time';data2=[time(:,1),data{1,10}(:,1),data{1,10}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol10.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,11})-1];time=time';data2=[time(:,1),data{1,11}(:,1),data{1,11}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol11.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,12})-1];time=time';data2=[time(:,1),data{1,12}(:,1),data{1,12}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol12.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,13})-1];time=time';data2=[time(:,1),data{1,13}(:,1),data{1,13}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol13.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,14})-1];time=time';data2=[time(:,1),data{1,14}(:,1),data{1,14}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol14.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,15})-1];time=time';data2=[time(:,1),data{1,15}(:,1),data{1,15}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol15.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,16})-1];time=time';data2=[time(:,1),data{1,16}(:,1),data{1,16}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol16.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,17})-1];time=time';data2=[time(:,1),data{1,17}(:,1),data{1,17}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol17.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,18})-1];time=time';data2=[time(:,1),data{1,18}(:,1),data{1,18}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol18.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,19})-1];time=time';data2=[time(:,1),data{1,19}(:,1),data{1,19}(:,2)];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol19.dat';save(UserFile, 'data2', '-ascii');
```



```
time=[0:1:length(data{1,20})-1];time=time';data2=[time(:,1),data{1,20}{(:,1)},data{1,20}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol20.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,21})-1];time=time';data2=[time(:,1),data{1,21}{(:,1)},data{1,21}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol21.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,22})-1];time=time';data2=[time(:,1),data{1,22}{(:,1)},data{1,22}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol22.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,23})-1];time=time';data2=[time(:,1),data{1,23}{(:,1)},data{1,23}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol23.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,24})-1];time=time';data2=[time(:,1),data{1,24}{(:,1)},data{1,24}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol24.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,25})-1];time=time';data2=[time(:,1),data{1,25}{(:,1)},data{1,25}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol25.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,26})-1];time=time';data2=[time(:,1),data{1,26}{(:,1)},data{1,26}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol26.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,27})-1];time=time';data2=[time(:,1),data{1,27}{(:,1)},data{1,27}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol27.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,28})-1];time=time';data2=[time(:,1),data{1,28}{(:,1)},data{1,28}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol28.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,29})-1];time=time';data2=[time(:,1),data{1,29}{(:,1)},data{1,29}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol29.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,30})-1];time=time';data2=[time(:,1),data{1,30}{(:,1)},data{1,30}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol30.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,31})-1];time=time';data2=[time(:,1),data{1,31}{(:,1)},data{1,31}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol31.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,32})-1];time=time';data2=[time(:,1),data{1,32}{(:,1)},data{1,32}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol32.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,33})-1];time=time';data2=[time(:,1),data{1,33}{(:,1)},data{1,33}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol33.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,34})-1];time=time';data2=[time(:,1),data{1,34}{(:,1)},data{1,34}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol34.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,35})-1];time=time';data2=[time(:,1),data{1,35}{(:,1)},data{1,35}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol35.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,36})-1];time=time';data2=[time(:,1),data{1,36}{(:,1)},data{1,36}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol36.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,37})-1];time=time';data2=[time(:,1),data{1,37}{(:,1)},data{1,37}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol37.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,38})-1];time=time';data2=[time(:,1),data{1,38}{(:,1)},data{1,38}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol38.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,39})-1];time=time';data2=[time(:,1),data{1,39}{(:,1)},data{1,39}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol39.dat';save(UserFile, 'data2', '-ascii');  
time=[0:1:length(data{1,40})-1];time=time';data2=[time(:,1),data{1,40}{(:,1)},data{1,40}{(:,2)}];UserFile =  
'C:\Users\deciantis\Desktop\unstitched\mol40.dat';save(UserFile, 'data2', '-ascii');
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time=[0:1:length(data{1,41})-1];time=time';data2=[time(:,1),data{1,41}{(:,1)},data{1,41}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol41.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,42})-1];time=time';data2=[time(:,1),data{1,42}{(:,1)},data{1,42}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol42.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,43})-1];time=time';data2=[time(:,1),data{1,43}{(:,1)},data{1,43}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol43.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,44})-1];time=time';data2=[time(:,1),data{1,44}{(:,1)},data{1,44}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol44.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,45})-1];time=time';data2=[time(:,1),data{1,45}{(:,1)},data{1,45}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol45.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,46})-1];time=time';data2=[time(:,1),data{1,46}{(:,1)},data{1,46}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol46.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,47})-1];time=time';data2=[time(:,1),data{1,47}{(:,1)},data{1,47}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol47.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,48})-1];time=time';data2=[time(:,1),data{1,48}{(:,1)},data{1,48}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol48.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,49})-1];time=time';data2=[time(:,1),data{1,49}{(:,1)},data{1,49}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol49.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,50})-1];time=time';data2=[time(:,1),data{1,50}{(:,1)},data{1,50}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol50.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,51})-1];time=time';data2=[time(:,1),data{1,51}{(:,1)},data{1,51}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol51.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,52})-1];time=time';data2=[time(:,1),data{1,52}{(:,1)},data{1,52}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol52.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,53})-1];time=time';data2=[time(:,1),data{1,53}{(:,1)},data{1,53}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol53.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,54})-1];time=time';data2=[time(:,1),data{1,54}{(:,1)},data{1,54}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol54.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,55})-1];time=time';data2=[time(:,1),data{1,55}{(:,1)},data{1,55}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol55.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,56})-1];time=time';data2=[time(:,1),data{1,56}{(:,1)},data{1,56}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol56.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,57})-1];time=time';data2=[time(:,1),data{1,57}{(:,1)},data{1,57}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol57.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,58})-1];time=time';data2=[time(:,1),data{1,58}{(:,1)},data{1,58}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol58.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,59})-1];time=time';data2=[time(:,1),data{1,59}{(:,1)},data{1,59}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol59.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,60})-1];time=time';data2=[time(:,1),data{1,60}{(:,1)},data{1,60}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol60.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,61})-1];time=time';data2=[time(:,1),data{1,61}{(:,1)},data{1,61}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol61.dat';save(UserFile, 'data2', '-ascii');
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time=[0:1:length(data{1,62})-1];time=time';data2=[time(:,1),data{1,62}{(:,1)},data{1,62}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol62.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,63})-1];time=time';data2=[time(:,1),data{1,63}{(:,1)},data{1,63}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol63.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,64})-1];time=time';data2=[time(:,1),data{1,64}{(:,1)},data{1,64}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol64.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,65})-1];time=time';data2=[time(:,1),data{1,65}{(:,1)},data{1,65}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol65.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,66})-1];time=time';data2=[time(:,1),data{1,66}{(:,1)},data{1,66}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol66.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,67})-1];time=time';data2=[time(:,1),data{1,67}{(:,1)},data{1,67}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol67.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,68})-1];time=time';data2=[time(:,1),data{1,68}{(:,1)},data{1,68}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol68.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,69})-1];time=time';data2=[time(:,1),data{1,69}{(:,1)},data{1,69}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol69.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,70})-1];time=time';data2=[time(:,1),data{1,70}{(:,1)},data{1,70}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol70.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,71})-1];time=time';data2=[time(:,1),data{1,71}{(:,1)},data{1,71}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol71.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,72})-1];time=time';data2=[time(:,1),data{1,72}{(:,1)},data{1,72}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol72.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,73})-1];time=time';data2=[time(:,1),data{1,73}{(:,1)},data{1,73}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol73.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,74})-1];time=time';data2=[time(:,1),data{1,74}{(:,1)},data{1,74}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol74.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,75})-1];time=time';data2=[time(:,1),data{1,75}{(:,1)},data{1,75}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol75.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,76})-1];time=time';data2=[time(:,1),data{1,76}{(:,1)},data{1,76}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol76.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,77})-1];time=time';data2=[time(:,1),data{1,77}{(:,1)},data{1,77}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol77.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,78})-1];time=time';data2=[time(:,1),data{1,78}{(:,1)},data{1,78}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol78.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,79})-1];time=time';data2=[time(:,1),data{1,79}{(:,1)},data{1,79}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol79.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,80})-1];time=time';data2=[time(:,1),data{1,80}{(:,1)},data{1,80}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol80.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,81})-1];time=time';data2=[time(:,1),data{1,81}{(:,1)},data{1,81}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol81.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,82})-1];time=time';data2=[time(:,1),data{1,82}{(:,1)},data{1,82}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol82.dat';save(UserFile, 'data2', '-ascii');
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time=[0:1:length(data{1,83})-1];time=time';data2=[time(:,1),data{1,83}{(:,1)},data{1,83}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol83.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,84})-1];time=time';data2=[time(:,1),data{1,84}{(:,1)},data{1,84}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol84.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,85})-1];time=time';data2=[time(:,1),data{1,85}{(:,1)},data{1,85}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol85.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,86})-1];time=time';data2=[time(:,1),data{1,86}{(:,1)},data{1,86}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol86.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,87})-1];time=time';data2=[time(:,1),data{1,87}{(:,1)},data{1,87}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol87.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,88})-1];time=time';data2=[time(:,1),data{1,88}{(:,1)},data{1,88}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol88.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,89})-1];time=time';data2=[time(:,1),data{1,89}{(:,1)},data{1,89}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol89.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,90})-1];time=time';data2=[time(:,1),data{1,90}{(:,1)},data{1,90}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol90.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,91})-1];time=time';data2=[time(:,1),data{1,91}{(:,1)},data{1,91}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol91.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,92})-1];time=time';data2=[time(:,1),data{1,92}{(:,1)},data{1,92}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol92.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,93})-1];time=time';data2=[time(:,1),data{1,93}{(:,1)},data{1,93}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol93.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,94})-1];time=time';data2=[time(:,1),data{1,94}{(:,1)},data{1,94}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol94.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,95})-1];time=time';data2=[time(:,1),data{1,95}{(:,1)},data{1,95}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol95.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,96})-1];time=time';data2=[time(:,1),data{1,96}{(:,1)},data{1,96}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol96.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,97})-1];time=time';data2=[time(:,1),data{1,97}{(:,1)},data{1,97}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol97.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,98})-1];time=time';data2=[time(:,1),data{1,98}{(:,1)},data{1,98}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol98.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,99})-1];time=time';data2=[time(:,1),data{1,99}{(:,1)},data{1,99}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol99.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,100})-1];time=time';data2=[time(:,1),data{1,100}{(:,1)},data{1,100}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol100.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,101})-1];time=time';data2=[time(:,1),data{1,101}{(:,1)},data{1,101}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol101.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,102})-1];time=time';data2=[time(:,1),data{1,102}{(:,1)},data{1,102}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol102.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,103})-1];time=time';data2=[time(:,1),data{1,103}{(:,1)},data{1,103}{(:,2)}];UserFile =
'C:\Users\deciantis\Desktop\unstitched\mol103.dat';save(UserFile, 'data2', '-ascii');
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time=[0:1:length(data{1,167})-1];time=time';data2=[time(:,1),data{1,167}(:,1),data{1,167}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol167.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,168})-1];time=time';data2=[time(:,1),data{1,168}(:,1),data{1,168}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol168.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,169})-1];time=time';data2=[time(:,1),data{1,169}(:,1),data{1,169}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol169.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,170})-1];time=time';data2=[time(:,1),data{1,170}(:,1),data{1,170}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol170.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,171})-1];time=time';data2=[time(:,1),data{1,171}(:,1),data{1,171}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol171.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,172})-1];time=time';data2=[time(:,1),data{1,172}(:,1),data{1,172}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol172.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,173})-1];time=time';data2=[time(:,1),data{1,173}(:,1),data{1,173}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol173.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,174})-1];time=time';data2=[time(:,1),data{1,174}(:,1),data{1,174}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol174.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,175})-1];time=time';data2=[time(:,1),data{1,175}(:,1),data{1,175}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol175.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,176})-1];time=time';data2=[time(:,1),data{1,176}(:,1),data{1,176}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol176.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,177})-1];time=time';data2=[time(:,1),data{1,177}(:,1),data{1,177}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol177.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,178})-1];time=time';data2=[time(:,1),data{1,178}(:,1),data{1,178}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol178.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,179})-1];time=time';data2=[time(:,1),data{1,179}(:,1),data{1,179}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol179.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,180})-1];time=time';data2=[time(:,1),data{1,180}(:,1),data{1,180}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol180.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,181})-1];time=time';data2=[time(:,1),data{1,181}(:,1),data{1,181}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol181.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,182})-1];time=time';data2=[time(:,1),data{1,182}(:,1),data{1,182}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol182.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,183})-1];time=time';data2=[time(:,1),data{1,183}(:,1),data{1,183}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol183.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,184})-1];time=time';data2=[time(:,1),data{1,184}(:,1),data{1,184}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol184.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,185})-1];time=time';data2=[time(:,1),data{1,185}(:,1),data{1,185}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol185.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,186})-1];time=time';data2=[time(:,1),data{1,186}(:,1),data{1,186}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol186.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,187})-1];time=time';data2=[time(:,1),data{1,187}(:,1),data{1,187}(:,2)];UserFile
= 'C:\Users\deciantis\Desktop\unstitched\mol187.dat';save(UserFile, 'data2', '-ascii');
```



```
time=[0:1:length(data{1,188})-1];time=time';data2=[time(:,1),data{1,188}{(:,1)},data{1,188}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol188.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,189})-1];time=time';data2=[time(:,1),data{1,189}{(:,1)},data{1,189}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol189.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,190})-1];time=time';data2=[time(:,1),data{1,190}{(:,1)},data{1,190}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol190.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,191})-1];time=time';data2=[time(:,1),data{1,191}{(:,1)},data{1,191}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol191.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,192})-1];time=time';data2=[time(:,1),data{1,192}{(:,1)},data{1,192}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol192.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,193})-1];time=time';data2=[time(:,1),data{1,193}{(:,1)},data{1,193}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol193.dat';save(UserFile, 'data2', '-ascii');
time=[0:1:length(data{1,194})-1];time=time';data2=[time(:,1),data{1,194}{(:,1)},data{1,194}{(:,2)}];UserFile
='C:\Users\deciantis\Desktop\unstitched\mol194.dat';save(UserFile, 'data2', '-ascii');
```



```
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol124dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol125dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol126dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol127dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol128dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol129dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol130dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol131dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol132dwell.dat -ascii
>> load C:\Users\deciantis\Desktop\hammy_input_files\mol133dwell.dat -ascii
```

Appendix E

```
>> dwells{1,1}=mol1dwell;
>> dwells{1,2}=mol2dwell;
>> dwells{1,3}=mol3dwell;
>> dwells{1,4}=mol4dwell;
>> dwells{1,5}=mol5dwell;
>> dwells{1,6}=mol6dwell;
>> dwells{1,7}=mol7dwell;
>> dwells{1,8}=mol8dwell;
>> dwells{1,9}=mol9dwell;
>> dwells{1,10}=mol10dwell;
>> dwells{1,11}=mol11dwell;
>> dwells{1,12}=mol12dwell;
>> dwells{1,13}=mol13dwell;
>> dwells{1,14}=mol14dwell;
>> dwells{1,15}=mol15dwell;
>> dwells{1,16}=mol16dwell;
>> dwells{1,17}=mol17dwell;
>> dwells{1,18}=mol18dwell;
>> dwells{1,19}=mol19dwell;
>> dwells{1,20}=mol20dwell;
>> dwells{1,21}=mol21dwell;
>> dwells{1,22}=mol22dwell;
>> dwells{1,23}=mol23dwell;
>> dwells{1,24}=mol24dwell;
>> dwells{1,25}=mol25dwell;
>> dwells{1,26}=mol26dwell;
>> dwells{1,27}=mol27dwell;
>> dwells{1,28}=mol28dwell;
>> dwells{1,29}=mol29dwell;
>> dwells{1,30}=mol30dwell;
>> dwells{1,31}=mol31dwell;
>> dwells{1,32}=mol32dwell;
>> dwells{1,33}=mol33dwell;
>> dwells{1,34}=mol34dwell;
>> dwells{1,35}=mol35dwell;
>> dwells{1,36}=mol36dwell;
>> dwells{1,37}=mol37dwell;
>> dwells{1,38}=mol38dwell;
>> dwells{1,39}=mol39dwell;
```

```
>> dwells{1,40}=mol40dwell;
>> dwells{1,41}=mol41dwell;
>> dwells{1,42}=mol42dwell;
>> dwells{1,43}=mol43dwell;
>> dwells{1,44}=mol44dwell;
>> dwells{1,45}=mol45dwell;
>> dwells{1,46}=mol46dwell;
>> dwells{1,47}=mol47dwell;
>> dwells{1,48}=mol48dwell;
>> dwells{1,49}=mol49dwell;
>> dwells{1,50}=mol50dwell;
>> dwells{1,51}=mol51dwell;
>> dwells{1,52}=mol52dwell;
>> dwells{1,53}=mol53dwell;
>> dwells{1,54}=mol54dwell;
>> dwells{1,55}=mol55dwell;
>> dwells{1,56}=mol56dwell;
>> dwells{1,57}=mol57dwell;
>> dwells{1,58}=mol58dwell;
>> dwells{1,59}=mol59dwell;
>> dwells{1,60}=mol60dwell;
>> dwells{1,61}=mol61dwell;
>> dwells{1,62}=mol62dwell;
>> dwells{1,63}=mol63dwell;
>> dwells{1,64}=mol64dwell;
>> dwells{1,65}=mol65dwell;
>> dwells{1,66}=mol66dwell;
>> dwells{1,67}=mol67dwell;
>> dwells{1,68}=mol68dwell;
>> dwells{1,69}=mol69dwell;
>> dwells{1,70}=mol70dwell;
>> dwells{1,71}=mol71dwell;
>> dwells{1,72}=mol72dwell;
>> dwells{1,73}=mol73dwell;
>> dwells{1,74}=mol74dwell;
>> dwells{1,75}=mol75dwell;
>> dwells{1,76}=mol76dwell;
>> dwells{1,77}=mol77dwell;
>> dwells{1,78}=mol78dwell;
>> dwells{1,79}=mol79dwell;
>> dwells{1,80}=mol80dwell;
>> dwells{1,81}=mol81dwell;
```

```
>> dwells{1,82}=mol82dwell;  
>> dwells{1,83}=mol83dwell;  
>> dwells{1,84}=mol84dwell;  
>> dwells{1,85}=mol85dwell;  
>> dwells{1,86}=mol86dwell;  
>> dwells{1,87}=mol87dwell;  
>> dwells{1,88}=mol88dwell;  
>> dwells{1,89}=mol89dwell;  
>> dwells{1,90}=mol90dwell;  
>> dwells{1,91}=mol91dwell;  
>> dwells{1,92}=mol92dwell;  
>> dwells{1,93}=mol93dwell;  
>> dwells{1,94}=mol94dwell;  
>> dwells{1,95}=mol95dwell;  
>> dwells{1,96}=mol96dwell;  
>> dwells{1,97}=mol97dwell;  
>> dwells{1,98}=mol98dwell;  
>> dwells{1,99}=mol99dwell;  
>> dwells{1,100}=mol100dwell;  
>> dwells{1,101}=mol101dwell;  
>> dwells{1,102}=mol102dwell;  
>> dwells{1,103}=mol103dwell;  
>> dwells{1,104}=mol104dwell;  
>> dwells{1,105}=mol105dwell;  
>> dwells{1,106}=mol106dwell;  
>> dwells{1,107}=mol107dwell;  
>> dwells{1,108}=mol108dwell;  
>> dwells{1,109}=mol109dwell;  
>> dwells{1,110}=mol110dwell;  
>> dwells{1,110}=mol110dwell;  
>> dwells{1,111}=mol111dwell;  
>> dwells{1,112}=mol112dwell;  
>> dwells{1,113}=mol113dwell;  
>> dwells{1,114}=mol114dwell;  
>> dwells{1,115}=mol115dwell;  
>> dwells{1,116}=mol116dwell;  
>> dwells{1,117}=mol117dwell;  
>> dwells{1,118}=mol118dwell;  
>> dwells{1,119}=mol119dwell;  
>> dwells{1,120}=mol120dwell;  
>> dwells{1,121}=mol121dwell;  
>> dwells{1,122}=mol122dwell;
```



```
>> dwells{1,123}=mol123dwell;  
>> dwells{1,124}=mol124dwell;  
>> dwells{1,125}=mol125dwell;  
>> dwells{1,126}=mol126dwell;  
>> dwells{1,127}=mol127dwell;  
>> dwells{1,128}=mol128dwell;  
>> dwells{1,129}=mol129dwell;  
>> dwells{1,130}=mol130dwell;  
>> dwells{1,131}=mol131dwell;  
>> dwells{1,132}=mol132dwell;  
>> dwells{1,133}=mol133dwell;
```