In[1]:=
```
{NotebookFileName[], DateString[]}
```
Out[1]=
```
{H:\morpheus\worm3\worm3.nb, Sat 24 Apr 2021 11:14:54}
```

Setup

In[2]:=
```
Needs["Developer`"]
```

In[3]:=
```
$HistoryLength = 5
```
Out[3]=
```
5
```

In[4]:=
```
curDir = FileNameDrop[NotebookFileName[]]
```
Out[4]=
```
H:\morpheus\worm3
```

In[5]:=
```
modelName = FileNameTake[curDir, -1]
```
Out[5]=
```
worm3
```

In[6]:=
```
logFile = "logger.csv"
```
Out[6]=
```
logger.csv
```

Sweep 13

In[7]:=
```
sweep = 13
```
Out[7]=
```
13
```

In[8]:=
```
sweepDir = FileNameJoin[{curDir, modelName <> "_sweep_" <> ToString[sweep]}]
```
Out[8]=
```
H:\morpheus\worm3\worm3_sweep_13
```

In[9]:=
```
sweeps = FileNames[modelName <> "*", sweepDir];
```

In[10]:=
```
"sweeps" <> ToString[sweep] <> "=sweeps"
```
Out[10]=
```
sweeps13=sweeps
```

In[11]:=
```
ToExpression[
 "sweeps" <> ToString[sweep] <> "=sweeps"
]
```

Out[11]=
```
{H:\morpheus\worm3\worm3_sweep_13\worm3_166,
 H:\morpheus\worm3\worm3_sweep_13\worm3_167, H:\morpheus\worm3\worm3_sweep_13\worm3_168,
 H:\morpheus\worm3\worm3_sweep_13\worm3_169, H:\morpheus\worm3\worm3_sweep_13\worm3_170,
 H:\morpheus\worm3\worm3_sweep_13\worm3_171, H:\morpheus\worm3\worm3_sweep_13\worm3_172,
 H:\morpheus\worm3\worm3_sweep_13\worm3_173, H:\morpheus\worm3\worm3_sweep_13\worm3_174,
 H:\morpheus\worm3\worm3_sweep_13\worm3_175, H:\morpheus\worm3\worm3_sweep_13\worm3_176,
 H:\morpheus\worm3\worm3_sweep_13\worm3_177, H:\morpheus\worm3\worm3_sweep_13\worm3_178,
 H:\morpheus\worm3\worm3_sweep_13\worm3_179, H:\morpheus\worm3\worm3_sweep_13\worm3_180,
 H:\morpheus\worm3\worm3_sweep_13\worm3_181, H:\morpheus\worm3\worm3_sweep_13\worm3_182,
 H:\morpheus\worm3\worm3_sweep_13\worm3_183, H:\morpheus\worm3\worm3_sweep_13\worm3_184,
 H:\morpheus\worm3\worm3_sweep_13\worm3_185, H:\morpheus\worm3\worm3_sweep_13\worm3_186,
 H:\morpheus\worm3\worm3_sweep_13\worm3_187, H:\morpheus\worm3\worm3_sweep_13\worm3_188,
 H:\morpheus\worm3\worm3_sweep_13\worm3_189, H:\morpheus\worm3\worm3_sweep_13\worm3_190}
```

In[12]:=
```
sweep13a = Import[
  FileNameJoin[{sweeps13[[1]], logFile}],
  {"CSV", "Dataset"}
  , HeaderLines → 1
 ]
```

Out[12]=

time	0
cell.id	1
8 total ›	
time	0
cell.id	2
8 total ›	
time	0
cell.id	3
8 total ›	
time	0
cell.id	4
8 total ›	
time	0
cell.id	5
8 total ›	
time	0
cell.id	6
8 total ›	
time	0
cell.id	7
8 total ›	
time	0
cell.id	8
8 total ›	
time	0
cell.id	9
8 total ›	
time	0
cell.id	10
8 total ›	
⤒ ↑ rows 1–10 of 204 ↓ ⤓	

In[13]:=
```
sweep13a[[1]]["MKtemp"]
```

Out[13]=
```
0.4
```

In[14]:=
```
sweep13a[[1]] // Keys
```

Out[14]=

time
cell.id
cell.center.x
cell.center.y
delta_r.x
delta_r.y
MKtemp
cmstrength

In[15]:=
```
sweep13a[GroupBy["time"]][[-1]]
```

Out[15]=

time	cell.id	cell.center.x	cell.center.y	delta_r.x	delta_r.y	MKtemp	cmstren
10000	1	870.6	470.25	370.6	−29.75	0.4	0.4
10000	2	504.3	2487	304.3	−13	0.4	0.4
10000	3	649.55	2452.7	448.55	−47.3	0.4	0.4
10000	4	524.619	2486.52	322.619	−13.4762	0.4	0.4
10000	5	598.1	2429.7	395.1	−70.3	0.4	0.4
10000	6	605.7	2453.2	401.7	−46.8	0.4	0.4
10000	7	581.737	2450.84	376.737	−49.1579	0.4	0.4
10000	8	650.6	2471.7	444.6	−28.3	0.4	0.4
10000	9	635.8	2489.3	428.8	−10.7	0.4	0.4
10000	10	600.5	2484.05	392.5	−15.95	0.4	0.4
10000	11	584	2516.5	375	16.5	0.4	0.4
10000	12	572.2	2376.5	372.2	−124.5	0.4	0.4
10000	13	545.5	2463.6	344.5	−37.4	0.4	0.4
10000	14	531.65	2449.35	329.65	−51.65	0.4	0.4
10000	15	582.45	2471.65	379.45	−29.35	0.4	0.4
10000	16	570.143	2463.67	366.143	−37.3333	0.4	0.4
10000	17	564.55	2487.1	359.55	−13.9	0.4	0.4
10000	18	573.684	2476.58	367.684	−24.4211	0.4	0.4
10000	19	602.3	2463.45	395.3	−37.55	0.4	0.4
10000	20	659.45	2431.9	451.45	−69.1	0.4	0.4

rows 1–20 of 101

In[16]:=
```
sweep13a[GroupBy["time"]][[-1]][StandardDeviation]
```

Out[16]=

time	0.0
cell.id	29.3002
cell.center.x	52.3319
cell.center.y	206.631
delta_r.x	41.086
delta_r.y	38.4953
MKtemp	0.0
cmstrength	0.0

In[17]:=
```
estimateVelocityDiffusion[
  sweepDir_String,
  logName_ : logFile
 ] := Module[{sweepds, tfinal, temp, cms, μx, μy, σx, σy},
  sweepds = Import[
    FileNameJoin[{sweepDir, logName}],
    {"CSV", "Dataset"}
    , HeaderLines → 1
   ];
  sweepds = sweepds[GroupBy["time"]][[-1]];
  temp = sweepds[[1]]["MKtemp"];
  cms = sweepds[[1]]["cmstrength"];
  tfinal = sweepds[[1]]["time"];
  {σx, σy} = sweepds[All, {"delta_r.x", "delta_r.y"}][StandardDeviation] /@
    {"delta_r.x", "delta_r.y"};
  {μx, μy} = sweepds[All, {"delta_r.x", "delta_r.y"}][Mean] /@ {"delta_r.x", "delta_r.y"};
  <|
   "cmstrength" → cms,
   "temperature" -> temp,
   "tfinal" → tfinal,
   "vmean" → μx/tfinal,
   "Dx" → σx^2/(2 tfinal),
   "Dy" → σy^2/(2 tfinal),
   "Dxy" -> (σx^2 + σy^2)/(4 tfinal)
   |>
 ]
```

In[18]:=
```
estimateVelocityDiffusion[sweeps13[[1]]]
```

Out[18]=
```
⟨| cmstrength → 0.4, temperature → 0.4, tfinal → 10000,
 vmean → 0.0367569, Dx → 0.0844028, Dy → 0.0740943, Dxy → 0.0792486 |⟩
```

In[19]:=
```
ds = Dataset[estimateVelocityDiffusion /@ sweeps];
```

In[20]:=
```
"ds" <> ToString[sweep] <> "=ds"
```

Out[20]=
```
ds13=ds
```

In[21]:=
```
ToExpression[
 "ds" <> ToString[sweep] <> "=ds"
]
```

Out[21]=

cmstrength	temperature	tfinal	vmean	Dx	Dy	Dxy
0.4	0.4	10000	0.0367569	0.0844028	0.0740943	0.0792486
0.8	0.4	10000	0.102452	0.154437	0.0784874	0.116462
1.2	0.4	10000	0.167612	0.203845	0.0767462	0.140296
1.6	0.4	10000	0.181401	0.201903	0.070369	0.136136
2	0.4	10000	0.189384	0.188775	0.0709209	0.129848
0.4	0.8	10000	0.0449629	0.13455	0.108338	0.121444
0.8	0.8	10000	0.0950115	0.205538	0.107538	0.156538
1.2	0.8	10000	0.136687	0.222773	0.134475	0.178624
1.6	0.8	10000	0.156601	0.182713	0.175889	0.179301
2	0.8	10000	0.171515	0.18381	0.117479	0.150644
0.4	1.2	10000	0.0386038	0.171728	0.147898	0.159813
0.8	1.2	10000	0.0794119	0.195052	0.150989	0.173021
1.2	1.2	10000	0.114539	0.192954	0.164518	0.178736
1.6	1.2	10000	0.13649	0.208063	0.154024	0.181044
2	1.2	10000	0.155122	0.166677	0.17019	0.168433
0.4	1.6	10000	0.0335375	0.163101	0.202495	0.182798
0.8	1.6	10000	0.0667943	0.197536	0.140111	0.168823
1.2	1.6	10000	0.098084	0.222733	0.162083	0.192408
1.6	1.6	10000	0.120988	0.195638	0.226752	0.211195
2	1.6	10000	0.140554	0.155564	0.140498	0.148031

rows 1–20 of 25

In[22]:=
```
ds13[[All, {"cmstrength", "vmean"}]]
```

Out[22]=

cmstrength	vmean
0.4	0.0367569
0.8	0.102452
1.2	0.167612
1.6	0.181401
2	0.189384
0.4	0.0449629
0.8	0.0950115
1.2	0.136687
1.6	0.156601
2	0.171515
0.4	0.0386038
0.8	0.0794119
1.2	0.114539
1.6	0.13649
2	0.155122
0.4	0.0335375
0.8	0.0667943
1.2	0.098084
1.6	0.120988
2	0.140554

rows 1–20 of 25

Sweep 17

In[23]:=
```
sweep = 17
```

Out[23]= 17

In[24]:=
```
sweepDir = FileNameJoin[{curDir, modelName <> "_sweep_" <> ToString[sweep]}]
```

Out[24]= H:\morpheus\worm3\worm3_sweep_17

In[25]:=
```
sweeps = FileNames[modelName <> "*", sweepDir];
```

In[26]:=
```
"sweeps" <> ToString[sweep] <> "=sweeps"
```

Out[26]=
```
sweeps17=sweeps
```

In[27]:=
```
ToExpression[
 "sweeps" <> ToString[sweep] <> "=sweeps"
]
```

Out[27]=
```
{H:\morpheus\worm3\worm3_sweep_17\worm3_240,
 H:\morpheus\worm3\worm3_sweep_17\worm3_241, H:\morpheus\worm3\worm3_sweep_17\worm3_242,
 H:\morpheus\worm3\worm3_sweep_17\worm3_243, H:\morpheus\worm3\worm3_sweep_17\worm3_244,
 H:\morpheus\worm3\worm3_sweep_17\worm3_245, H:\morpheus\worm3\worm3_sweep_17\worm3_246,
 H:\morpheus\worm3\worm3_sweep_17\worm3_247, H:\morpheus\worm3\worm3_sweep_17\worm3_248,
 H:\morpheus\worm3\worm3_sweep_17\worm3_249, H:\morpheus\worm3\worm3_sweep_17\worm3_250,
 H:\morpheus\worm3\worm3_sweep_17\worm3_251, H:\morpheus\worm3\worm3_sweep_17\worm3_252,
 H:\morpheus\worm3\worm3_sweep_17\worm3_253, H:\morpheus\worm3\worm3_sweep_17\worm3_254,
 H:\morpheus\worm3\worm3_sweep_17\worm3_255, H:\morpheus\worm3\worm3_sweep_17\worm3_256,
 H:\morpheus\worm3\worm3_sweep_17\worm3_257, H:\morpheus\worm3\worm3_sweep_17\worm3_258,
 H:\morpheus\worm3\worm3_sweep_17\worm3_259, H:\morpheus\worm3\worm3_sweep_17\worm3_260,
 H:\morpheus\worm3\worm3_sweep_17\worm3_261, H:\morpheus\worm3\worm3_sweep_17\worm3_262,
 H:\morpheus\worm3\worm3_sweep_17\worm3_263, H:\morpheus\worm3\worm3_sweep_17\worm3_264}
```

In[28]:=
```
ds = Dataset[estimateVelocityDiffusion /@ sweeps];
```

In[29]:=
```
"ds" <> ToString[sweep] <> "=ds"
```

Out[29]=
```
ds17=ds
```

In[30]:=
```
ToExpression[
 "ds" <> ToString[sweep] <> "=ds"
]
```

Out[30]=

cmstrength	temperature	tfinal	vmean	Dx	Dy	Dxy
0.1	0.1	10000	0.000156504	0.00502622	0.00552954	0.00527788
0.2	0.1	10000	0.000188777	0.00530404	0.00580448	0.00555426
0.3	0.1	10000	0.000277936	0.0060392	0.00629977	0.00616948
0.4	0.1	10000	0.000412058	0.00736087	0.00718301	0.00727194
0.5	0.1	10000	0.000924614	0.0120294	0.00888474	0.0104571
0.1	0.2	10000	0.00118837	0.0177748	0.0173333	0.017554
0.2	0.2	10000	0.0027896	0.0231621	0.0173094	0.0202357
0.3	0.2	10000	0.00515659	0.0291933	0.019519	0.0243562
0.4	0.2	10000	0.00940813	0.0436375	0.0180889	0.0308632
0.5	0.2	10000	0.0161551	0.0570799	0.0227524	0.0399161
0.1	0.3	10000	0.00511495	0.0451628	0.0437705	0.0444667
0.2	0.3	10000	0.0099934	0.0497522	0.0365432	0.0431477
0.3	0.3	10000	0.0167892	0.0555812	0.0392974	0.0474393
0.4	0.3	10000	0.0255513	0.0795436	0.0416342	0.0605889
0.5	0.3	10000	0.0360479	0.0871608	0.0446167	0.0658887
0.1	0.4	10000	0.00775055	0.0619188	0.0751627	0.0685408
0.2	0.4	10000	0.0161887	0.0701318	0.0572496	0.0636907
0.3	0.4	10000	0.025616	0.0766701	0.0726433	0.0746567
0.4	0.4	10000	0.0367569	0.0844028	0.0740943	0.0792486
0.5	0.4	10000	0.0487673	0.10394	0.0645763	0.0842583

rows 1–20 of 25

In[31]:=
```
ds17[[All, {"cmstrength", "vmean"}]]
```

Out[31]=

cmstrength	vmean
0.1	0.000156504
0.2	0.000188777
0.3	0.000277936
0.4	0.000412058
0.5	0.000924614
0.1	0.00118837
0.2	0.0027896
0.3	0.00515659
0.4	0.00940813
0.5	0.0161551
0.1	0.00511495
0.2	0.0099934
0.3	0.0167892
0.4	0.0255513
0.5	0.0360479
0.1	0.00775055
0.2	0.0161887
0.3	0.025616
0.4	0.0367569
0.5	0.0487673

rows 1–20 of 25

Sweep 18

In[32]:=
```
sweep = 18
```

Out[32]= 18

In[33]:=
```
sweepDir = FileNameJoin[{curDir, modelName <> "_sweep_" <> ToString[sweep]}]
```

Out[33]= H:\morpheus\worm3\worm3_sweep_18

In[34]:=
```
sweeps = FileNames[modelName <> "*", sweepDir];
```

In[35]:=
```
"sweeps" <> ToString[sweep] <> "=sweeps"
```

Out[35]=
```
sweeps18=sweeps
```

In[36]:=
```
ToExpression[
 "sweeps" <> ToString[sweep] <> "=sweeps"
]
```

Out[36]=
```
{H:\morpheus\worm3\worm3_sweep_18\worm3_265,
 H:\morpheus\worm3\worm3_sweep_18\worm3_266, H:\morpheus\worm3\worm3_sweep_18\worm3_267,
 H:\morpheus\worm3\worm3_sweep_18\worm3_268, H:\morpheus\worm3\worm3_sweep_18\worm3_269,
 H:\morpheus\worm3\worm3_sweep_18\worm3_270, H:\morpheus\worm3\worm3_sweep_18\worm3_271,
 H:\morpheus\worm3\worm3_sweep_18\worm3_272, H:\morpheus\worm3\worm3_sweep_18\worm3_273,
 H:\morpheus\worm3\worm3_sweep_18\worm3_274, H:\morpheus\worm3\worm3_sweep_18\worm3_275,
 H:\morpheus\worm3\worm3_sweep_18\worm3_276, H:\morpheus\worm3\worm3_sweep_18\worm3_277,
 H:\morpheus\worm3\worm3_sweep_18\worm3_278, H:\morpheus\worm3\worm3_sweep_18\worm3_279,
 H:\morpheus\worm3\worm3_sweep_18\worm3_280, H:\morpheus\worm3\worm3_sweep_18\worm3_281,
 H:\morpheus\worm3\worm3_sweep_18\worm3_282, H:\morpheus\worm3\worm3_sweep_18\worm3_283,
 H:\morpheus\worm3\worm3_sweep_18\worm3_284, H:\morpheus\worm3\worm3_sweep_18\worm3_285,
 H:\morpheus\worm3\worm3_sweep_18\worm3_286, H:\morpheus\worm3\worm3_sweep_18\worm3_287,
 H:\morpheus\worm3\worm3_sweep_18\worm3_288, H:\morpheus\worm3\worm3_sweep_18\worm3_289}
```

In[37]:=
```
ds = Dataset[estimateVelocityDiffusion /@ sweeps];
```

In[38]:=
```
"ds" <> ToString[sweep] <> "=ds"
```

Out[38]=
```
ds18=ds
```

In[39]:=
```
ToExpression[
 "ds" <> ToString[sweep] <> "=ds"
]
```

Out[39]=

cmstrength	temperature	tfinal	vmean	Dx	Dy	Dxy
2	2	10000	0.126427	0.132125	0.207062	0.169593
4	2	10000	0.191567	0.188938	0.189556	0.189247
6	2	10000	0.219198	0.142244	0.164868	0.153556
8	2	10000	0.232657	0.137085	0.169462	0.153273
10	2	10000	0.236368	0.133814	0.161836	0.147825
2	4	10000	0.0843874	0.177933	0.180309	0.179121
4	4	10000	0.144689	0.197631	0.192094	0.194862
6	4	10000	0.18182	0.173037	0.206137	0.189587
8	4	10000	0.204452	0.189477	0.244021	0.216749
10	4	10000	0.21816	0.167897	0.228081	0.197989
2	6	10000	0.0632377	0.178398	0.19188	0.185139
4	6	10000	0.113198	0.16263	0.19526	0.178945
6	6	10000	0.149601	0.223638	0.238345	0.230992
8	6	10000	0.17741	0.166172	0.168336	0.167254
10	6	10000	0.193336	0.17804	0.207286	0.192663
2	8	10000	0.0503314	0.217682	0.175669	0.196675
4	8	10000	0.0928951	0.227748	0.201058	0.214403
6	8	10000	0.127298	0.194031	0.211789	0.20291
8	8	10000	0.153681	0.232498	0.236645	0.234572
10	8	10000	0.173344	0.16674	0.213753	0.190247

rows 1–20 of 25

In[40]:=
```
ds18[[All, {"cmstrength", "vmean"}]]
```

Out[40]=

cmstrength	vmean
2	0.126427
4	0.191567
6	0.219198
8	0.232657
10	0.236368
2	0.0843874
4	0.144689
6	0.18182
8	0.204452
10	0.21816
2	0.0632377
4	0.113198
6	0.149601
8	0.17741
10	0.193336
2	0.0503314
4	0.0928951
6	0.127298
8	0.153681
10	0.173344

rows 1–20 of 25

In[41]:=
```
ListPlot[ds18[[All, {"cmstrength", "vmean"}]]
]
```

Out[41]=