

```

In[230]:= LSquared[r_, v_] := (r[[1]] * v[[2]] - r[[2]] * v[[1]]) ^ 2;
IωSquared[r1_, r2_, l_] := (ArcTan[r1[[4]], r1[[3]]] - ArcTan[r2[[4]], r2[[3]]]) ^ 2
AngularKERatio[d_, n_] :=
  Module[
    {dir = d, name = n},
    {nparticles, dt, particlesT} = ParticleTimeSeries[dir, name];
    lSquared = Total[particlesT[[1, 1, 3 ;; 4]] ^ 2];

    velocitiesT = Differences[particlesT] / dt;
    linearKEt = velocitiesT[[All, All, 1]] ^ 2 + velocitiesT[[All, All, 2]] ^ 2;

    anglesT = ArcTan[particlesT[[All, All, 4]], particlesT[[All, All, 3]]];
    angularVelocitiesT = Differences[anglesT] / dt;
    avSquaredT = angularVelocitiesT[[All, All]] ^ 2;
    angularKEt = avSquaredT * lSquared / 12;
    (*moment of inertia or rod about center = ml^2/12*)

    ratio =
      Table[
        {
          (t - 1) * dt,
          Mean[angularKEt[[t]]] / (Mean[angularKEt[[t]]] + Mean[linearKEt[[t]]])
        },
        {t, 1, Length[velocitiesT]}
      ];
    ratio
  ]

In[220]:= {nparticles, dt, particlesT} = ParticleTimeSeries[mdwout <> ρdirs[[1]], "rods"];

ρs = {"0", ".08", ".16", ".24", ".32", ".40", ".48", ".56", ".64", ".72", ".80"};
ρdirs = Table["sticky_clnks_nml_np500_amRho.05_pmRho" <> ρ, {ρ, ρs}];

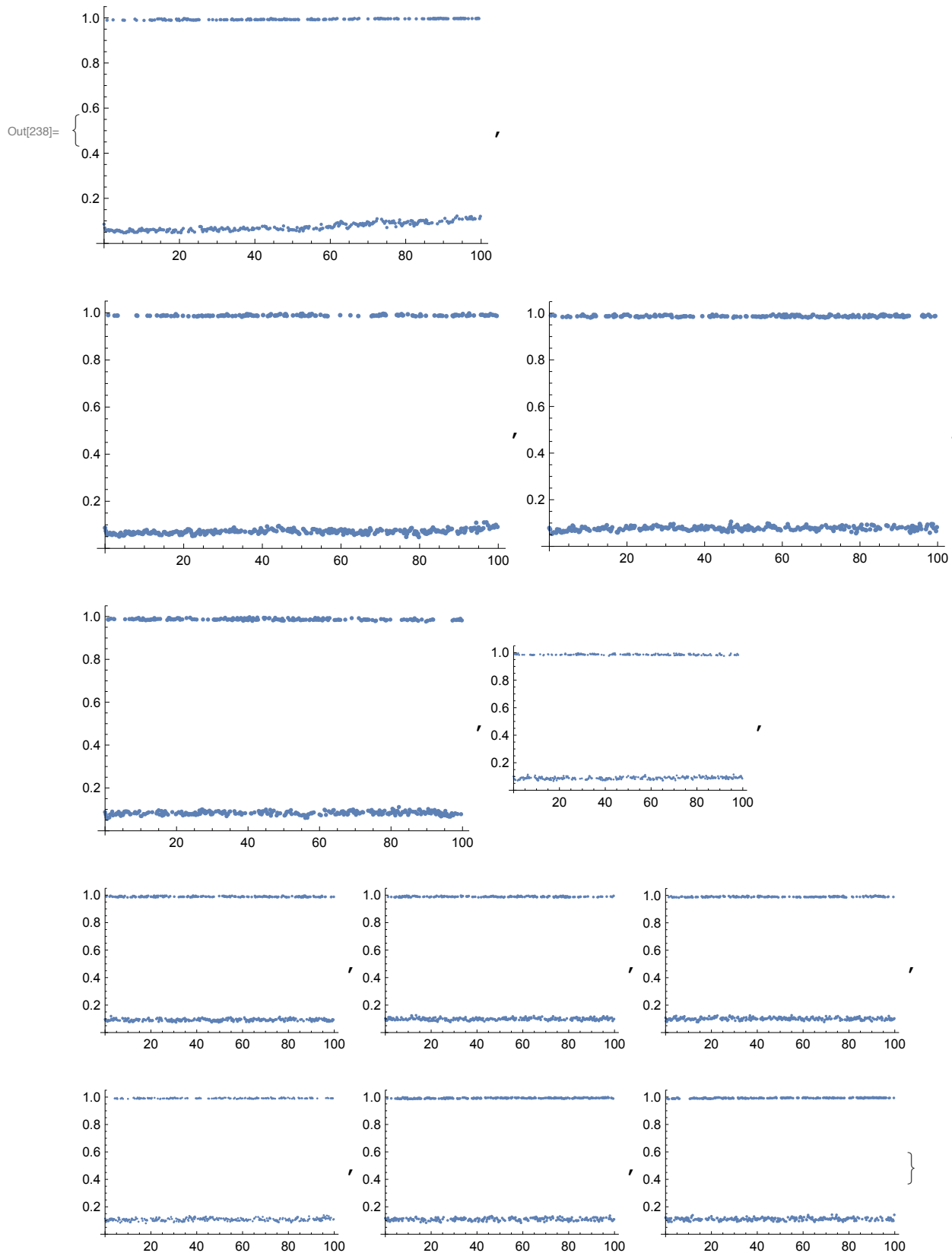
In[233]:= ratios = Table[AngularKERatio[mdwout <> ρdir, "rods"], {ρdir, ρdirs}];

In[235]:= ratios[[1, 1]]

Out[235]= {0., 0.0854279}

```

```
In[238]:= Table[ListPlot[ratios[[i]]], {i, 1, Length[ratios]}]
```

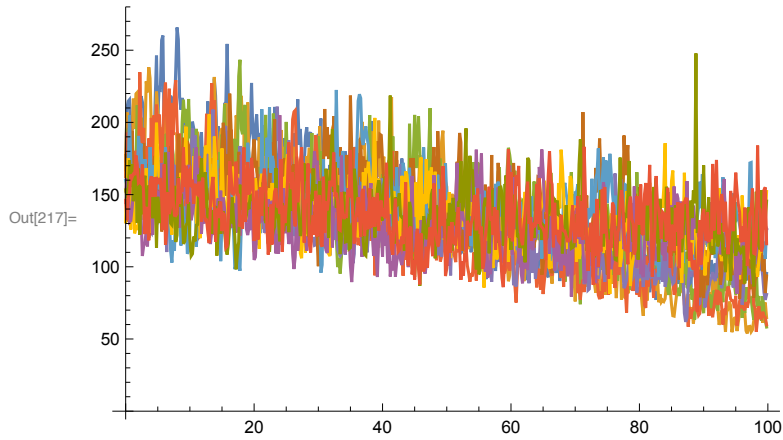


```
In[212]:= Ls = Table[AngularMomentum[mdwout <> rhoDir, "rods"], {rhoDir, rhoDir}];
```

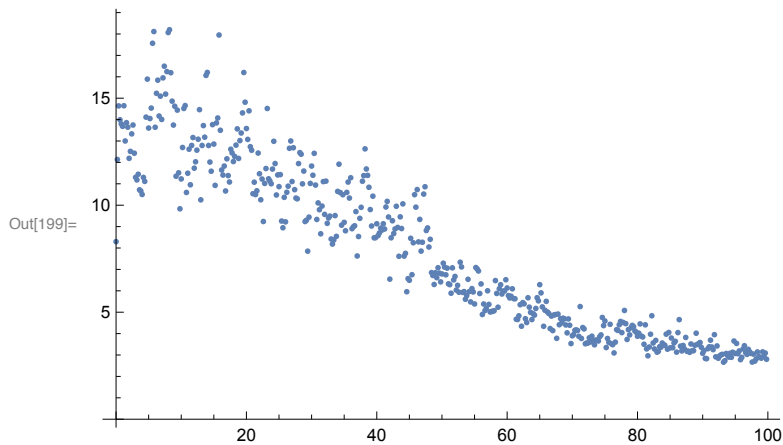
```
In[215]:= Ls2 = Table[
  Table[
    {Ls[[t, i, 1]], Mean[Ls[[t, i, 2]]]},
    {i, 1, Length[Ls[[t]]]}],
  {t, 1, Length[Ls]}];
```

```
In[203]:= Ls = Insert[Ls, L1, 1];
```

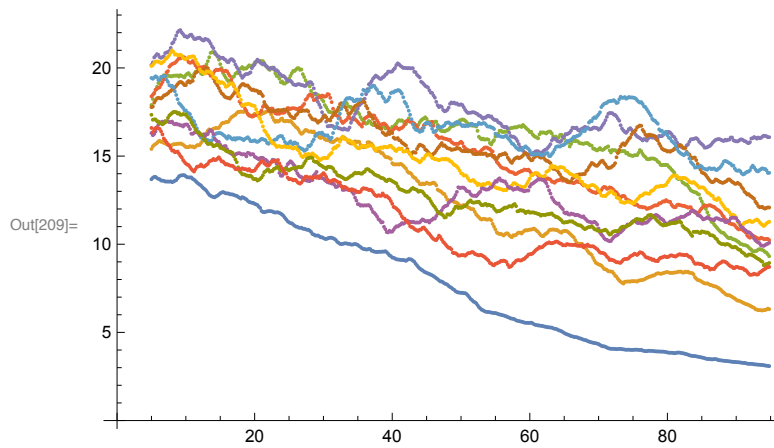
```
In[217]:= ListLinePlot[Ls2]
```



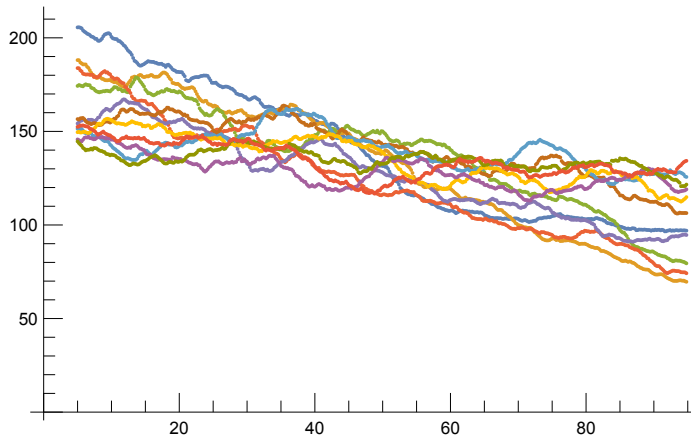
```
In[199]:= ListPlot[L1]
```



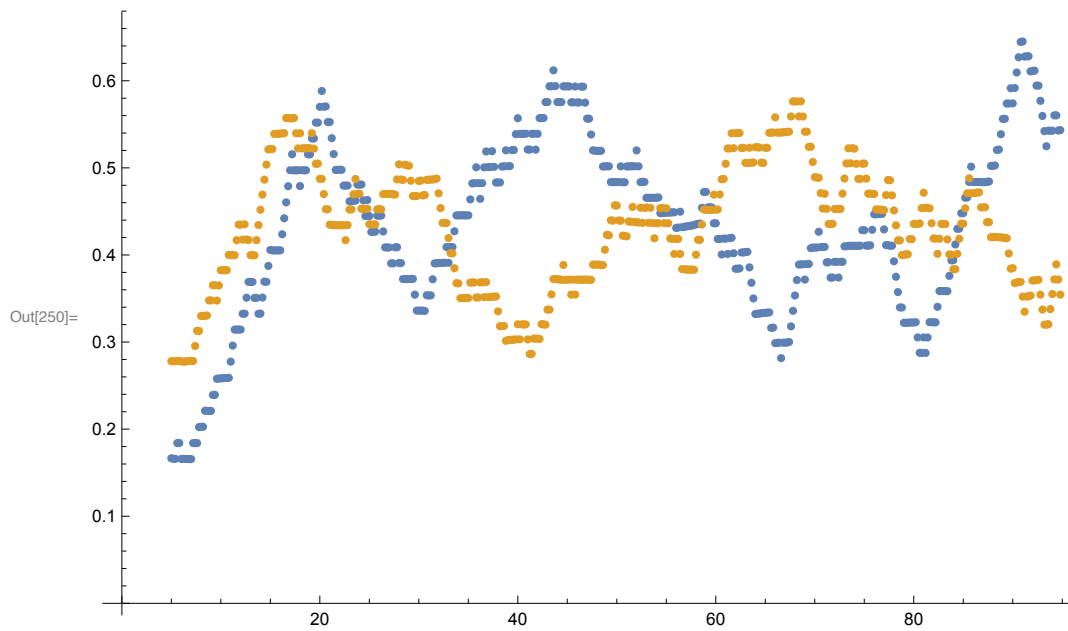
```
In[209]:= ListPlot[Table[
  Table[Mean[Ls[[j, i ;; i + 50]]], {i, 1, Length[Ls[[j]]] - 50}], {j, 1, Length[Ls]}]]
```



```
In[218]:= ListPlot[Table[Table[Mean[Ls2[[j, i ;; i + 50]]], {i, 1, Length[Ls2[[j]]] - 50}],
  {j, 1, Length[Ls2]}]]
```



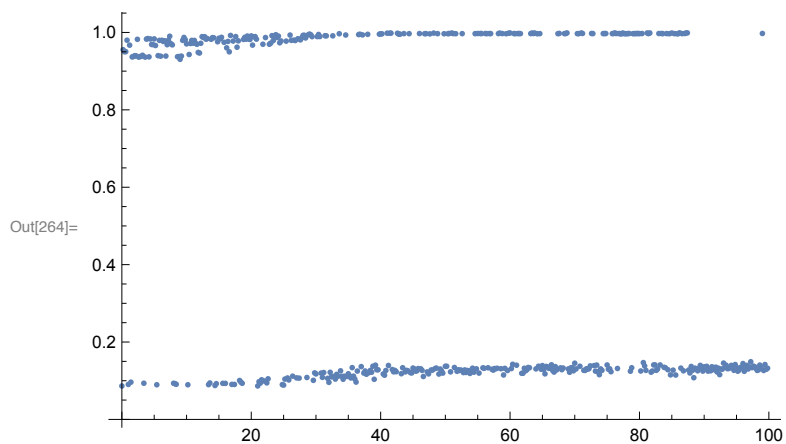
```
In[250]:= ListPlot[Table[
  Table[Mean[ratios[[j, i ;; i + 50]]], {i, 1, Length[ratios[[j]]] - 50}], {j, {1, 9}}]]
```



```
In[256]:= f = "clnks_nm1_np500_pmRho";
```

```
In[257]:= clnksrat = Table[AngularKERatio[mdwout <> f <>  $\rho$ , "rods"], { $\rho$ ,  $\rho$ s}];
```

```
In[264]:= ListPlot[clnksrat[[8]]]
```



```
In[255]:= frat[[1 ;; 25]] // TableForm
```

```
Out[255]//TableForm=
```

0.	0.0652402
0.2	0.0417947
0.4	0.984295
0.6	0.033866
0.8	0.0331282
1.	0.948516
1.2	0.946084
1.4	0.0326801
1.6	0.0335144
1.8	0.0308725
2.	0.973398
2.2	0.0391537
2.4	0.0388016
2.6	0.944913
2.8	0.946281
3.	0.988597
3.2	0.0330915
3.4	0.948701
3.6	0.971692
3.8	0.0375677
4.	0.949982
4.2	0.0397617
4.4	0.974503
4.6	0.949231
4.8	0.946843