This is my LAMMPS Input Script:

processors 4 4 4

units lj

atom\_style bond

special\_bonds lj/coul 0 1 1

read\_data polymer.dat

neighbor 0.4 bin

neigh\_modify every 1 delay 1

comm\_modify vel yes

bond\_style fene

bond\_coeff \* 30.0 1.5 1.0 1.0

dump mydump all custom 1000000 \*\_Monomer\_Coordinates.txt id type xu yu zu vx vy vz

timestep 0.01

thermo 1000

pair\_style dpd 1.0 1.0 122347

pair\_coeff \* \* 25 4.5 1.0

velocity all create 1.0 17786140

fix 1 all nve

run 50000

pair\_coeff \* \* 50.0 4.5 1.0

velocity all create 1.0 15086120

run 50

pair\_coeff \* \* 100.0 4.5 1.0

velocity all create 1.0 15786120

run 50

pair\_coeff \* \* 150.0 4.5 1.0

velocity all create 1.0 15486120

run 50

pair\_coeff \* \* 200.0 4.5 1.0

velocity all create 1.0 17986120

run 100

pair\_coeff \* \* 250.0 4.5 1.0

velocity all create 1.0 15006120

run 100

pair\_coeff \* \* 500.0 4.5 1.0

velocity all create 1.0 15087720

run 100

pair\_coeff \* \* 1000.0 4.5 1.0

velocity all create 1.0 15086189

run 100

pair\_style hybrid/overlay lj/cut 1.122462 dpd/tstat 1.0 1.0 1.122462 122347

pair\_modify shift yes

pair\_coeff \* \* lj/cut 1.0 1.0 1.122462

pair\_coeff \* \* dpd/tstat 4.5 1.122462

velocity all create 1.0 1508612013

run 100

velocity all create 1.0 15086121

run 100

velocity all create 1.0 15086111

run 100

velocity all create 1.0 15086125

run 10000000

write\_data polymer.data

write\_restart my\_restart\_lj

* I have rerun this LAMMPS input script twice. I have obtained the exact same values for position coordinates xu, yu and zu and velocity coordinates vx vy and vz for the first dump file corresponding to 0 timestep in both reruns.
* However, all other dump files at greater timesteps records slightly different values for {xu yu zu} and {vx vy vz} when I compare the same dump files in my two reruns.

Because I am only rerunning the exact same input script with same random seed, I should be able to reproduce exactly the same dump file data.

I have listed a portion of my dump file results.

***2 of the Same Dump file data at 1000000 timestep***

1 1 1 9.2091399999999997e+00 2.2709900000000001e+01 2.1947099999999999e+01 7.969910e-02 -7.078330e-01 -4.315250e-01

2 1 1 1.0104400000000000e+01 2.2791399999999999e+01 2.1611599999999999e+01 -2.012160e-02 3.884010e-02 8.602910e-01

3 1 1 1.0935499999999999e+01 2.2696700000000000e+01 2.2099900000000002e+01 1.956490e-01 2.107250e-01 8.622750e-01

4 1 1 1.1425300000000000e+01 2.2721299999999999e+01 2.2952100000000002e+01 -2.235620e-01 6.446940e-01 -2.849690e-01

5 1 1 1.1817500000000001e+01 2.2163100000000000e+01 2.2349499999999999e+01 1.011320e+00 1.371700e+00 -1.264130e+00

6 1 1 1.2134800000000000e+01 2.1608799999999999e+01 2.3070699999999999e+01 3.676340e-01 -5.535310e-01 1.392540e+00

7 1 1 1.1853700000000000e+01 2.0874400000000001e+01 2.2616599999999998e+01 -1.601890e+00 1.359060e+00 6.685250e-01

8 1 1 1.1191300000000000e+01 2.0689399999999999e+01 2.3255600000000001e+01 -1.015820e-01 1.031920e+00 -7.875940e-01

9 1 1 1.0931600000000000e+01 1.9776000000000000e+01 2.3550100000000000e+01 -5.547540e-01 -9.032760e-01 -5.084740e-01

10 1 1 1.0003500000000001e+01 1.9881499999999999e+01 2.3699800000000000e+01 -6.950310e-01 7.780410e-01 -1.760440e-02

1 1 1 1.5108499999999999e+01 1.8003100000000000e+01 2.3966400000000000e+01 -4.521140e-01 9.329660e-01 -1.749940e+00

2 1 1 1.5265900000000000e+01 1.8422300000000000e+01 2.4814900000000002e+01 5.617260e-01 7.565540e-01 -3.358520e-01

3 1 1 1.4941900000000000e+01 1.9201699999999999e+01 2.4361499999999999e+01 -6.314320e-01 5.047190e-01 -1.090860e+00

4 1 1 1.4535800000000000e+01 1.9919300000000000e+01 2.4848299999999998e+01 -8.087500e-01 1.615730e+00 3.820640e-01

5 1 1 1.4422400000000000e+01 2.0023700000000002e+01 2.5820100000000000e+01 -7.433670e-01 3.521540e-01 -8.564510e-01

6 1 1 1.3754799999999999e+01 1.9303200000000000e+01 2.5665099999999999e+01 1.145260e-01 -1.339670e-01 -1.090090e+00

7 1 1 1.4595000000000001e+01 1.8945100000000000e+01 2.5827900000000000e+01 -1.328900e+00 3.583710e-01 -5.707700e-02

8 1 1 1.4304000000000000e+01 1.8007700000000000e+01 2.5647300000000001e+01 2.045700e+00 -3.356100e-01 7.053270e-01

9 1 1 1.3651899999999999e+01 1.7684200000000001e+01 2.5021599999999999e+01 4.021920e-01 -7.147430e-02 -5.598710e-01

10 1 1 1.3098100000000001e+01 1.6898800000000001e+01 2.5060099999999998e+01 -1.876770e-01 -1.503650e+00 6.391240e-01

***2 of the Same Dump file data at 5000000 timestep***

1 1 1 1.4437800000000001e+00 9.3386200000000006e+00 2.5481800000000000e+01 1.378550e-01 -1.038680e+00 1.336660e+00

2 1 1 5.1929199999999998e-01 9.4037600000000001e+00 2.5344300000000000e+01 1.663110e+00 2.007880e-01 -6.165710e-01

3 1 1 8.9052399999999998e-01 9.4347799999999999e+00 2.4501899999999999e+01 6.707870e-01 1.881910e-02 -2.992850e-01

4 1 1 8.2558699999999996e-01 1.0418600000000000e+01 2.4360900000000001e+01 -1.899090e-01 1.274180e+00 2.795060e-01

5 1 1 -3.3569200000000000e-02 1.0259100000000000e+01 2.4131599999999999e+01 -4.052410e-01 3.888370e-01 -2.323760e+00

6 1 1 -8.5281300000000004e-01 1.0740200000000000e+01 2.3986000000000001e+01 -6.654680e-01 9.311160e-01 1.314180e+00

7 1 1 -3.7129299999999998e-01 1.1145000000000000e+01 2.3291100000000000e+01 1.211640e+00 9.575120e-01 -3.711020e-01

8 1 1 -9.1912700000000000e-02 1.1418400000000000e+01 2.4107700000000001e+01 -6.190150e-01 1.474360e-01 1.718070e-01

9 1 1 1.4000899999999999e-01 1.0993600000000001e+01 2.4936100000000000e+01 -1.043210e+00 2.046730e-01 4.270330e-01

10 1 1 7.1698899999999999e-01 1.0537800000000001e+01 2.5530700000000000e+01 4.661960e-01 -4.011640e-01 -2.159770e-01

1 1 1 6.1293300000000004e+00 8.6685999999999996e+00 2.1621400000000001e+01 1.513320e+00 -3.335600e-01 8.058070e-01

2 1 1 5.4701100000000000e+00 8.2773000000000003e+00 2.2268400000000000e+01 4.575170e-02 -1.927270e+00 -1.063110e+00

3 1 1 6.4494400000000001e+00 8.4814299999999996e+00 2.2545700000000000e+01 8.787040e-01 -7.366000e-01 -4.717050e-01

4 1 1 6.6459799999999998e+00 9.4134399999999996e+00 2.2455500000000001e+01 5.489610e-01 2.404900e+00 -3.302530e-01

5 1 1 6.1669900000000002e+00 1.0136500000000000e+01 2.2907699999999998e+01 1.491120e+00 7.519620e-02 -1.402650e+00

6 1 1 6.1509900000000002e+00 1.0317000000000000e+01 2.1973299999999998e+01 -1.157010e+00 -4.980190e-01 7.279770e-01

7 1 1 7.0640499999999999e+00 1.0347099999999999e+01 2.2277400000000000e+01 -2.027990e-01 -1.541220e+00 1.413770e-01

8 1 1 7.9958299999999998e+00 1.0490900000000000e+01 2.2178999999999998e+01 -2.004970e-01 3.503910e-01 -1.182150e+00

9 1 1 8.1447900000000004e+00 1.1409400000000000e+01 2.2155600000000000e+01 6.752610e-01 6.950500e-01 1.847660e-01

10 1 1 9.0459899999999998e+00 1.1051000000000000e+01 2.2043700000000001e+01 4.107950e-01 1.826080e+00 1.726400e-01

***2 of the Same Dump file data at 8000000 timestep***

1 1 1 8.3430800000000005e+00 1.0068199999999999e+01 1.4229500000000000e+01 1.437900e+00 -5.655600e-01 -1.042180e-01

2 1 1 8.7083999999999993e+00 9.5351900000000001e+00 1.3429300000000000e+01 -5.271820e-01 -8.289980e-01 7.819700e-01

3 1 1 7.9492500000000001e+00 9.6136400000000002e+00 1.2833200000000000e+01 -5.083030e-01 -4.377260e-02 -7.286060e-01

4 1 1 8.3774999999999995e+00 9.3334299999999999e+00 1.1942299999999999e+01 6.759770e-01 7.828810e-01 5.541600e-01

5 1 1 8.8737399999999997e+00 8.3946299999999994e+00 1.1892799999999999e+01 3.904950e-01 4.470420e-01 4.609770e-01

6 1 1 9.1492400000000007e+00 7.8726900000000004e+00 1.2693000000000000e+01 3.282070e-01 1.775530e-01 -1.087060e+00

7 1 1 9.1689500000000006e+00 8.9124199999999991e+00 1.2680899999999999e+01 3.467120e-01 4.946470e-01 -4.562100e-01

8 1 1 9.6152800000000003e+00 9.7460799999999992e+00 1.2466200000000001e+01 -1.931770e-01 -5.861650e-01 2.004350e-01

9 1 1 9.7873199999999994e+00 1.0335300000000000e+01 1.1752500000000000e+01 -1.515650e+00 8.469020e-01 -1.430630e+00

10 1 1 9.6367100000000008e+00 1.1093400000000001e+01 1.1171500000000000e+01 8.004470e-01 8.718240e-01 8.074050e-01

1 1 1 -5.4051899999999997e-01 8.7070000000000007e+00 1.6898700000000002e+01 -2.404620e+00 -2.437710e-01 -9.939720e-01

2 1 1 2.7869300000000002e-01 8.4546399999999995e+00 1.6541300000000000e+01 -9.297530e-01 -5.275340e-01 4.225840e-01

3 1 1 1.0270400000000000e+00 8.4313599999999997e+00 1.7309699999999999e+01 7.065610e-01 2.480600e-01 6.879650e-01

4 1 1 7.0600700000000005e-01 8.5196500000000004e+00 1.8207500000000000e+01 2.420940e+00 2.614880e+00 9.716750e-01

5 1 1 2.8749900000000000e-01 7.6274199999999999e+00 1.8071000000000002e+01 -5.599470e-01 1.635400e+00 2.115250e+00

6 1 1 1.1761100000000000e+00 7.4568199999999996e+00 1.8035900000000002e+01 -2.233980e-01 -8.805990e-01 1.007600e+00

7 1 1 1.1103300000000000e+00 6.9091399999999998e+00 1.8815200000000001e+01 6.552830e-01 -1.420120e+00 5.683740e-01

8 1 1 1.0626500000000001e+00 6.3925400000000003e+00 1.7959399999999999e+01 1.038760e+00 -2.143530e+00 1.236310e+00

9 1 1 2.0083899999999999e+00 6.4058299999999999e+00 1.7895800000000001e+01 5.164920e-01 6.567370e-01 1.299580e+00

10 1 1 2.1403200000000000e+00 6.3395500000000000e+00 1.8835200000000000e+01 1.554240e+00 8.367720e-01 3.521060e-01

***2 of the Same Dump file data at 10000000 timestep***

1 1 1 -7.2068199999999996e+00 8.2918299999999991e+00 3.2505699999999997e+01 -9.502460e-01 -1.005930e+00 -3.465600e-01

2 1 1 -7.3584399999999999e+00 7.4276499999999999e+00 3.1961800000000000e+01 1.541490e+00 -5.210680e-01 -1.305010e+00

3 1 1 -7.5461799999999997e+00 7.4653999999999998e+00 3.1045600000000000e+01 -2.702910e-01 -4.936540e-01 9.645390e-01

4 1 1 -6.8218699999999997e+00 7.9983800000000000e+00 3.1396999999999998e+01 1.042590e+00 -8.199940e-01 7.733890e-01

5 1 1 -6.4716500000000003e+00 8.1578800000000005e+00 3.0510899999999999e+01 -1.125430e+00 -8.145370e-01 -1.904730e+00

6 1 1 -6.4317099999999998e+00 8.9512800000000006e+00 3.1016900000000000e+01 -8.312190e-01 1.935730e-01 1.465270e+00

7 1 1 -6.9899600000000000e+00 9.5335500000000000e+00 3.0502099999999999e+01 1.223000e+00 9.960620e-01 -1.146340e-01

8 1 1 -6.9845499999999996e+00 1.0299799999999999e+01 3.1101400000000002e+01 3.061160e+00 -1.623800e-01 1.229950e+00

9 1 1 -6.3059599999999998e+00 1.0090800000000000e+01 3.1674099999999999e+01 -6.890650e-02 -4.199520e-01 1.958510e+00

10 1 1 -6.0139699999999996e+00 9.8728499999999997e+00 3.0838200000000001e+01 1.423450e-01 8.689630e-01 1.861540e+00

1 1 1 1.1679600000000001e+01 1.4578200000000001e+01 9.9227799999999995e+00 1.131150e+00 -5.414510e-01 -4.729850e-01

2 1 1 1.1237500000000001e+01 1.3806800000000001e+01 1.0365500000000001e+01 -2.409390e-01 9.004970e-02 -4.222170e-01

3 1 1 1.2021000000000001e+01 1.3550900000000000e+01 9.8783499999999993e+00 -1.625170e+00 1.255170e+00 1.973580e-01

4 1 1 1.2588100000000001e+01 1.4253600000000000e+01 1.0228400000000001e+01 -8.308950e-01 -5.497240e-01 6.110520e-02

5 1 1 1.2629000000000000e+01 1.3570399999999999e+01 1.0951700000000001e+01 -3.681410e-01 5.881790e-01 -3.896580e-01

6 1 1 1.1958700000000000e+01 1.4209400000000000e+01 1.1265900000000000e+01 -3.087320e-01 3.855060e-01 1.761830e-01

7 1 1 1.2219600000000000e+01 1.4980600000000001e+01 1.0803400000000000e+01 9.699970e-01 8.670680e-01 1.724860e+00

8 1 1 1.3027799999999999e+01 1.5249300000000000e+01 1.1173000000000000e+01 -5.325370e-02 1.200770e+00 5.462330e-01

9 1 1 1.3984100000000000e+01 1.5003200000000000e+01 1.1262700000000001e+01 5.602170e-01 4.369100e-01 1.230550e-01

10 1 1 1.4763199999999999e+01 1.5190899999999999e+01 1.1784100000000000e+01 2.637870e-01 3.988920e-01 -1.310120e+00