**Tasks:**

1. Please test out the multiscale entropy code on the pos\_x and pos\_y of the files a\_cms.py and d\_cms.py respectively. Please plot each case respectively
2. Sometimes there is math error (i, e division by zero) while using such timeseries. If you see math error let me know.
3. Sometimes the length of the timeseries may be too long and the multiscale entropy takes too long to run. Can you multithread the multiscale entropy calculation for the ‘scale’ part i,e the calculation of M.S.E at different scales.
4. I am attaching a new data set for prediction using echo state network. The data set contains 1.txt, 2.txt, ……and 25.txt respectively. Each file contains t,u,v, and z(3 \* 25 =75 dimensions). We want to predict the u,v, and z. ‘t’ is the time. Try 40/60 allocation. That is 40% for training 60% for prediction. If prediction is not good you may increase the percentage allocated for training. Follow the same approach for all echo state network prediction problems. The goal is to maximize the prediction interval. (This is like a high dimensional prediction problem but with even more higher dimensions.)
5. Use the new data (the new a\_cms.py and d\_cms.py) for the parallel reservoir project. This is the link to the github link: <https://github.com/pvlachas/RNN-RC-Chaos>  . This is the link to a useful paper for the parallel reservoir (just in case if you need)<https://arxiv.org/pdf/1910.05266.pdf>
6. For the echo state network Lyapunov exponent calculation we followed the incorrect approach. In order to determine the Lyapunov exponents for the reservoir we need to follow the algorithm on **page 32**, <https://arxiv.org/pdf/1910.05266.pdf> I feel that you might get this code in the github repo that I sent you, so look there before we start to code this.

Let me know if you have any questions. **The tasks are in the order of priority**