**[Brief instruction on how to run the (mechanical stress) yeast budding code]**

1. Upload the entire folder under a personal directory on any computing cluster service (ND\_CRC and UCR\_HPCC are in consideration in this manual).
2. To compile and run the simulation => ND\_CRC: module load gcc/7.1.0; module load cuda/9.2; make clean; make -j 12; qsub run.sh [...] UCR\_HPCC: module load extra; module load GCC; module load cuda/9.1; make clean; make -j 12 (or just 'make' unless you request an interactive session due to resource restriction); sbatch -p gpu --gres=gpu:p100:1 --time=100:00:00 SBATCH.sh;
3. To change parameter, change saved file&image name, refer to the following files: System.cu, Storage.cpp, SBATCH.sh (or run.sh for ND\_CRC).
4. A few things to keep in mind: the cell wall does not start to weaken exactly at the septin ring. It starts at a slight distance away from the septin ring. The current weakening pattern is chosen to be the hill equation type so *we will disregard parameters not related to the hill equation type.* The weakening pattern is not entirely smooth as the scaling approaches zero, I currently force the minimum weakened scale to be no less than some pre-defined value but it remains smooth during the transition (sharpest decay).
5. Primary parameters (parenthesis represents the location of the declaration):

* (generalParams.)SCALE\_TYPE: type of cell wall weakening pattern.
* (generalParams.)hilleqnconst: the constant 'K' in the hill equation (wikipedia).
* (generalParams.)hilleqnpow: the hill coefficient 'n' in the hill equation (wikipedia).
* (generalParams.)insertion\_energy\_cost: this determines the coefficient for the cell wall insertion energy. -log(P), P is the probability you designate.
* (generalParams.)strain\_threshold: this determines the coefficient for the cell wall insertion energy. This value indicates the max strain where cell wall insertion is unconditionally triggered.
* Max\_Runtime: max number of iteration before the growth algorithm is triggered.
* SAMPLE\_SIZE: used in the edge-swap algorithm, this determines the number of tested edges per edge-swap event.
* RECORD\_TIME: print image and record data.
* translate\_frequency: how often (for every n iteration) the cell is being recentered and triggering edge-swap algorithm.
* NKBT: the number of edge-swap algorithms needed to conclude simulation. This currently act as the maximum iterations (NKBT\*Max\_Runtime) during a simulation.
* (generalParams.)Rmin, (generalParams.)abs\_Rmin: determine the equilibrium length of each edge and the volume exclusion radius, respectively.
* (areaTriangleInfoVecs.)initial\_area, (bendingTriangleInfoVecs.)initial\_angle: the equilibrium area of each triangle and the equilibrium dihedral angle between two triangles.
* (linearSpringInfoVecs.)spring\_constant\_rep1, spring\_constant\_rep2: for Morse potential volume exclusion.
* (generalParams.)volume\_spring\_constant: unscaled magnitude of the outward expansion force.
* (generalParams.)line\_tension\_constant: the rigidity of the septin ring.
* scale\_linear, scale\_bend, scale\_area: determines the maximally weakened mechanical properties. For example, scale\_linear = linearSpringInfoVecs.spring\_constant\*0.5 indicates that the maximally weakened area has linear spring strength equals to 50% of the non-weakened area.