Overview and Motivation

The Plant Cell Periclinal Cortical Microtubule Array (PCMA) DGG

- The PCMA experiments with two face shapes:
    1. Square ($5\mu m \times 5\mu m = 25\mu m^2$)
    2. Rectangular ($8.33\mu m \times 3\mu m = 25\mu m^2$)
- Within each category 6 scenarios are run, 16 repetitions, 92 experiments for 2 hours of biological time:
    (1) Collision Induced Catastrophe Boundary with high rate of zippering.
    (2) CLASP on the boundary with high rate of crossover.
    (3) Influx of Microtubules from the anticlinal face with high rate of zippering.
    (4) through (6), CLASP on the boundary with high rate of zippering.

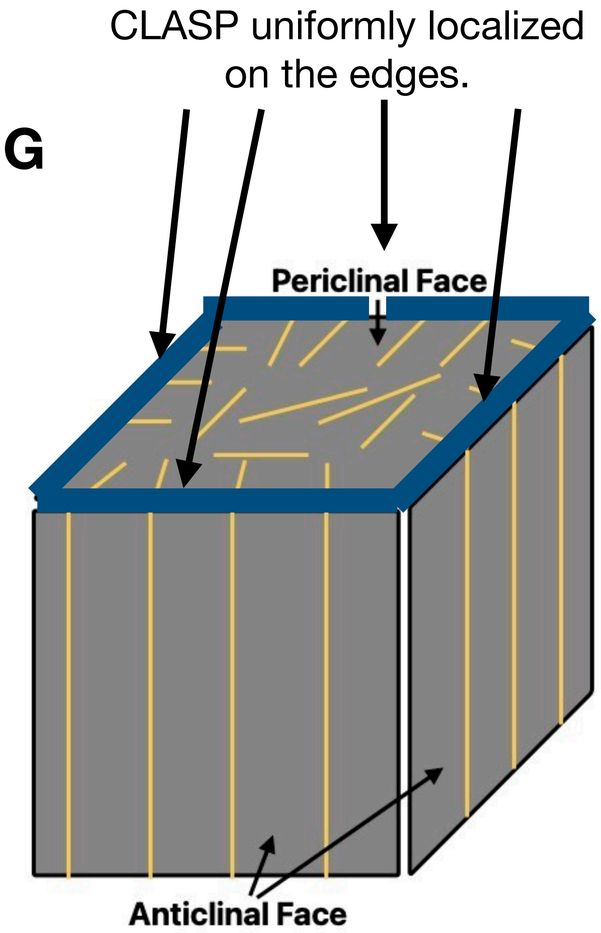

Figure 39: Visualization of our approximation of the cell as a polyhedral prism, where we restrict our simulations to the periclinal face and have a “picket fence” idealization[1].

1. (Shaw, 2013)

Selected Modeling Choices

Key Differences between the CMA DGG and PCMA DGG

- Originally, zippering was an attachment rule.
- Zippering now works to enforce a separation distance[1] of $\sigma_{sep} \approx 25nm$
- Addition of CLASP boundary rules.
- Added creation rules.
- Simplification of collision rules.

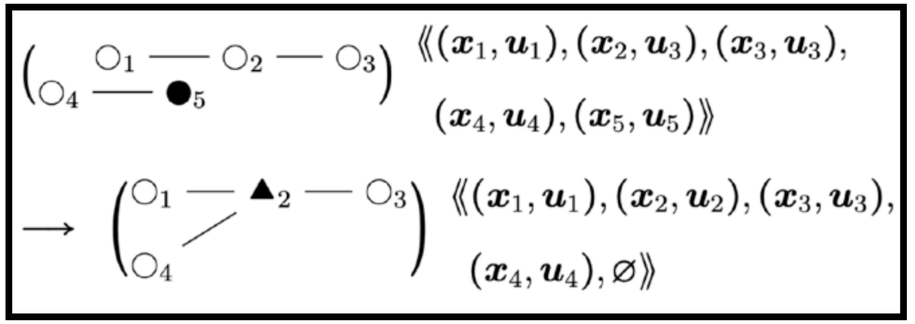

Figure 40: Previous Zippering Rule[2].

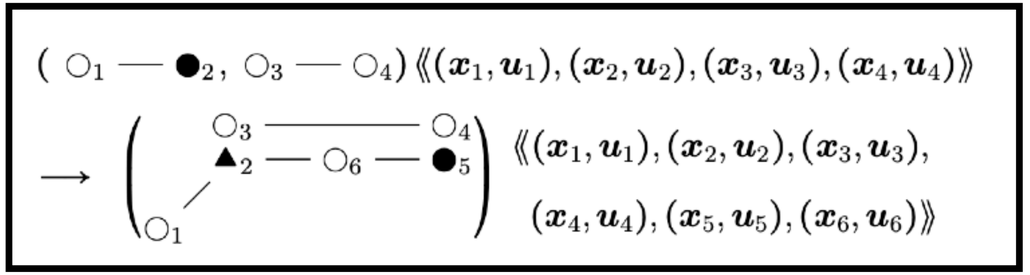

Figure 41: New Zippering Rule used in this model.

1. (Chan et al., 1999); 2. (Medwedeff and Mjolsness, 2023)