Introduction

The Cortical Microtubule Array

- A coarse scale biomechanics DGG model for cortical microtubules (CMT) in the cortical microtubule array (CMA) of plant cells has been developed as an example and provides a guide for how to use DGGs to study the self-organization mechanisms of CMTs.
- Key rules are bundling (a.k.a. zippering/entrainment), crossover, catastrophe.

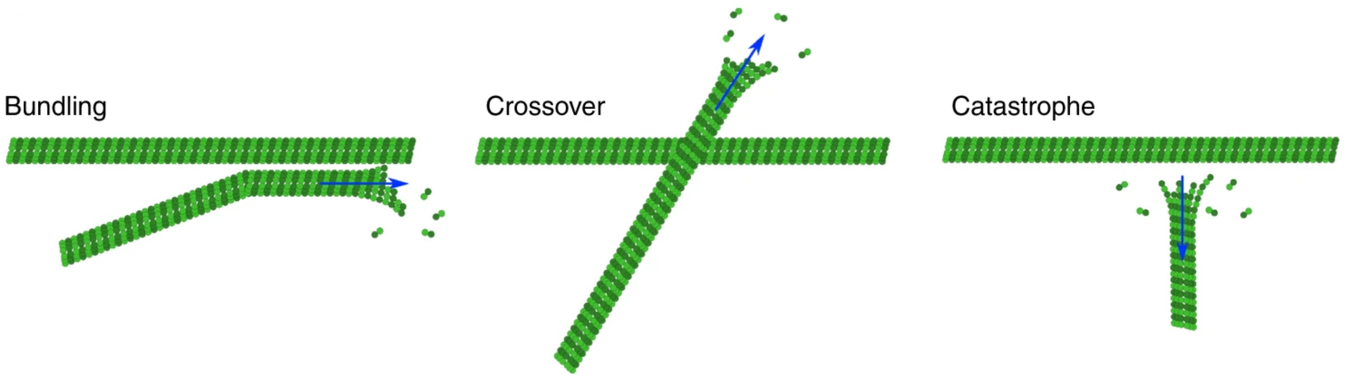

Figure 28: MT collision outcomes.

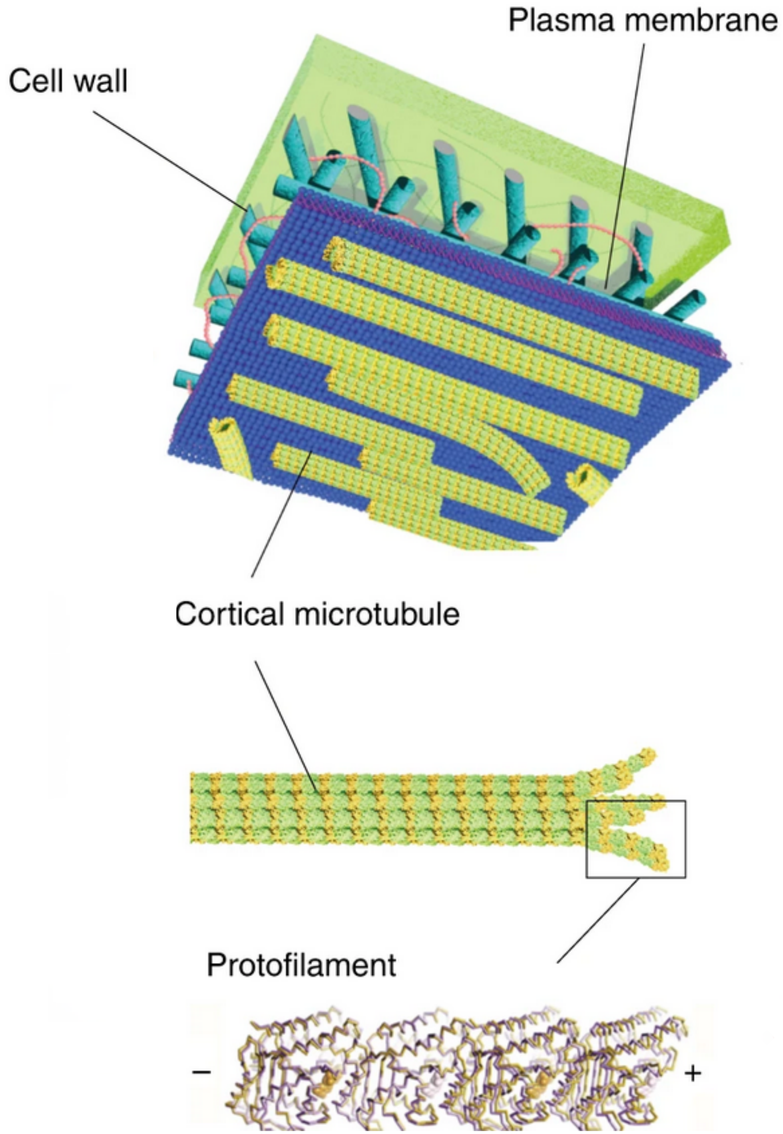

Figure 29: Overview of the CMA.

Image credits: (Hamant et al., 2019)

Overview and Motivation

The Plant Cell Cortical Microtubule Array (CMA) DGG

- The organization of the plant CMA is important for different cell processes.
- The results in this section are from the precursor to DGGML, CajeteCMA[2].
- We use this model as a test problem for the emergent effects of the crossover, zippering, and collision induce catastrophe.
- We also use this as an initial test of the “survival of aligned” hypothesis[3].

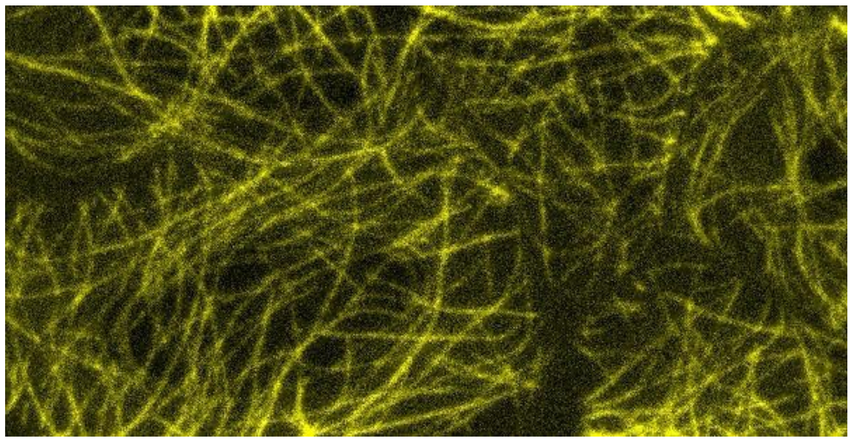

Figure 30: Cortical microtubules in Arabidopsis petiole cells[1].

1. (Mjolsness and Wightman) unpublished image data

2. (Medwedeff and Mjolsness, 2023); 3. (Tindemans et al., 2010)