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Measuring mitotic spindle formation through connection graphs STUART SCHAFFNER, Northeastern University, JORGE JOSE, University at Buffalo and Northeasern University — The mitotic spindle, an important structure formed during biological cell division, consists of a pattern of stiff fibers called microtubules and crosslinking molecular motor complexes. The spindle, consisting of objects interacting through pairwise interactions, is well suited to study via its connection graph. Thermal motion is important in this system; molecular motors attach and detach randomly from the microtubules, but only where the geometry allows. We have found the connection graph approach to be helpful in several ways for analyzing spindle properties. Monitoring the number and size of connected components in the graph allows us to quantify the development of the spindle bipolar pattern. Minimum cut-sets in components measure spindle pole robustness. These computations not only allow us to measure the dynamics of initial pattern formation, but also the structural rearrangements within spindles that have already formed. Our results are compared to known experimental results.

Jorge Jose
University at Buffalo

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