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Branched Actin Networks and Optimized Orientation D.A. QUINT, J.M. SCHWARZ, Syracuse University — Experiments measuring the orientation of extracted, *in vivo*-grown branched actin filaments with respect to the leading edge show a distribution prominently peaked at $\pm 35^\circ$, which is half of the measured branching angle. To understand this result, we model the successive generations of polymerizing, branched actin filaments as a set of coupled kinetic equations with a branching (birth) rate that depends on the orientation of the filament with respect to the leading edge of the cell and a constant capping (death) rate. We find in steady state that the orientation angle of the filament with respect to the leading edge optimizing for survival is in agreement with the observed values of $\pm 35^\circ$. A previous rate equation based model, introduced by Maly and Borisy, yields the same result but with an orientation dependent capping (death) rate. Given these similar outcomes, we investigate whether this result is generic for models where the birth and death rates are dependent on more general functions of the filament orientation. We also study the effects of fluctuations in the branching angle on the optimal orientation angle.

David Quint
Syracuse University

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