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Effects of crosslinks on motor-mediated filament organization¹

IGOR ARANSON, FALKO ZIEBERT, Argonne National Laboratory, LEV TSIMRING, University of California, San Diego — Crosslinks and molecular motors play an important role in the organization of cytoskeletal filament networks. Here we incorporate the effect of crosslinks into our model of polar motor-filament organization, through suppressing the relative sliding of filaments in the course of motor-mediated alignment. We show that this modification leads to a nontrivial macroscopic behavior, namely the oriented state exhibits a transverse instability in contrast to the isotropic instability that occurs without crosslinks. This transverse instability leads to the formation of dense extended bundles of oriented filaments, similar to recently observed structures in actomyosin. This model also can be applied to situations with two oppositely directed motor species or motors with different processing speeds.

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