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Fluid coupling in continuum modeling of microtubule motility assays CHRISTEL HOHENEGGER, University of Utah, TAMAR SHINAR, University of California, Riverside — Active networks are suspensions of actuated filaments obtained by mixing cytoskeletal filaments and small motor protein complexes. The network activity is achieved by the motion of the motor proteins along the filaments. Here, we focus on motility assays, where the molecular motors are anchored to a bottom plate and filaments are observed to glide in a quasi two-dimensional plane. In contrast to other studies, we are not interested in the detailed motion of each individual filament but only in the resulting coarse grained properties. We present a new continuum macroscopic model of motility assays including the evolution of rigid filaments density, bound and free motors densities and fluid velocity. The coupling between the fluid and the filaments is described via external, localized molecular forces inspired from the immersed boundary method. The reduction to a two-dimensional system in the plane of motion of the filaments is achieved via depth-averaging similar to Hele-Shaw approximation. We conclude with numerical simulations of the coupled two dimensional model with periodic boundary conditions.

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