# Dynamics of mictortubule and microtububle organizing center

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We examined models of microtubule dynamics, which were introduced to explain length regulation of microtubules via kinesin motors [1,2]. In statistical physics, these are variants of the one dimensional exclusion process, where the system length varies [3]. We first investigated a very simplified situation [2], taking into account the following events; polymerization and depolymerization at the plus end of a single microtubule, input of motor proteins at the minus end, and "walks" of motor proteins with mutual exclusion. We performed a mathematically rigorous analysis, as well as hydrodynamic approach [4]. We showed an exact phase diagram: the parameter space is divided into two phases corresponding to converging and diverging microtubules. Furthermore, we determined sub-phases in the divergent phase, according to the shapes of the density profile of motor proteins, by means of hydrodynamic approach and Monte Carlo simulations. Finally we would like to present a generalized process, by imposing detachment and attachment of molecular motors in the bulk of the microtubule, and the limitation of the system length. We shall discuss on the dynamics of the position of the microtububle organizing center.

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