

1086-92-1442

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Microtubules are intercellular filaments. Throughout the phenomenon of undergoing stochastic growth and shrinkage, they act as a molecular machine. This phenomenon is called dynamic instability. We will study the dynamic instability of microtubules in three states of growth, pause and shrinkage through Trichotomous Markov Noise (TMN). The analytic expression of Green's functions and first passage time distribution are calculated. (Received September 24, 2012)