Estimation of the diffusion coefficient of short actin fragments: The translational diffusion coefficient (D) of actin filaments was calculated based on the following equation [50]:

$$D = \left(\frac{kT}{3\pi\theta L}\right)\left(\ln\left(\frac{2L}{d}\right) - \left(\frac{1}{2}\right)\left(1.46 - 7.4\left(\frac{1}{\ln\left(\frac{2L}{d}\right)} - 0.34\right)^2 - 4.2\left(\frac{1}{\ln\left(\frac{2L}{d}\right)} - 0.39\right)^2\right)\right)$$

k is the Boltzmann constant, $T = 298°$ K is the absolute temperature, $\theta = 2.0$ centipoise [51] is the viscosity of cytoplasm, $L = 81$ nm is the length of an actin filament with 30 subunits and $d = 7$ nm is the diameter of an actin filament.