Synthetic molecular motors: A model study

Amartya Sarkar[1], *Alexander Mikhailov*[1]

[1]Fritz-Haber-Institut der Max-Planck-Gesellschaft, Berlin, Germany

A model of a synthetic molecular machine, whose operation closely resembles real molecular motors, is constructed and numerically investigated. The machine, described in terms of an elastic network, is able to perform cyclic conformational motions. These mechanochemical motions result from binding of a ligand, its conversion to a product, and the product release. The machine has two domains (arms) connected by a flexible hinge; while one of the arms is pinned, the other one is able to perform cyclic swinging motions. Due to ratchet interactions between the swinging arm and a stiff filament, internal cyclic motions in the machine become converted into directed translational motion of the filament. Stochastic simulations of this model motor system under the conditions of both weak and strong coupling are performed.