

Force-extension curves for biomolecules

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Single-molecule atomic force spectroscopy probes elastic properties of proteins such as titin and ubiquitin [1]. We analyze bioprotein folding dynamics under both force and length-clamp conditions by modeling polyprotein modules as particles in a bistable potential, connected by harmonic springs. The study of multistable equilibria in these models explains recorded sawtooth force-extension curves [2, 3]. We show that bifurcations and transitions through quasi-stationary domain configurations modified by thermal noise are involved in observed stepwise and abrupt refolding and unfolding phenomena under force-clamp conditions [4, 5, 6, 7]. These predictions agree with experimental observations.

References

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