

Modeling project: Titin extension

Physics of Complex Systems M2 – Biophysics

Titin is an incredibly large protein, the longest encoded in the human genome, and acts as a spring that allows the different parts of our muscle to remain in the correct position as they extend and retract. It is composed of 244 individually folded protein domains connected by unstructured peptide sequences. These domains unfold when the protein is stretched and refold when the tension is removed. The experiment illustrated in Fig. 1 uses a protein made of fragments of titin that mimicks its mechanical response under stretch, yielding the force-extension curve shown in Fig. 2.

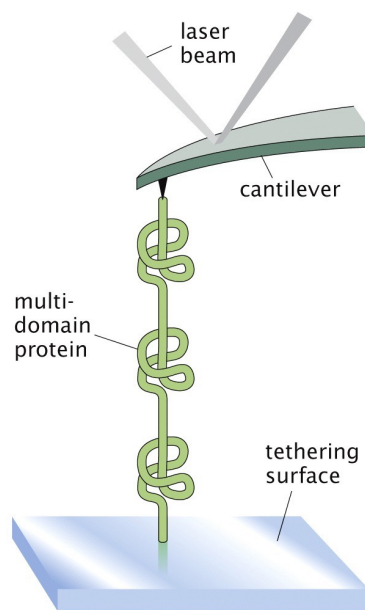


Figure 1: An atomic force microscope is used to stretch a protein made of the repeats of Ig module 27 of the I band of human cardiac titin.

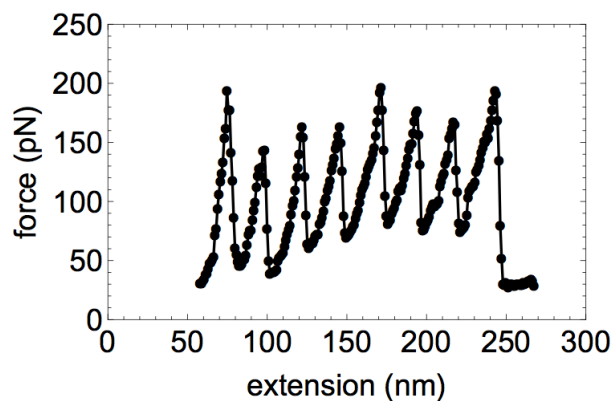


Figure 2: Force-extension curve collected in the experiment of Fig. 1.