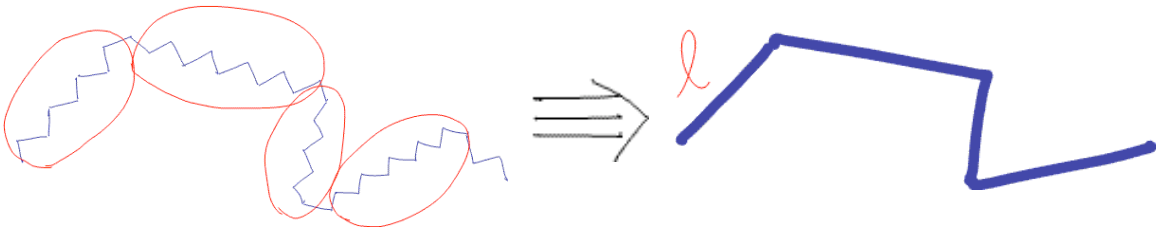
1.6. Kuhn chain model:

Recall, for n >> 1, $\langle R^2 \rangle_0 = C_\infty n a^2$

Therefore, we can imagine



The real chain is modeled as a freely-jointed chain of N segments, each of length l. Each segment may contain several monomers.

l = Kuhn statistical segment length

N = number of Kuhn segments

Contour length: $L = Nl = n a \cos\left(\frac{\theta}{2}\right)$

Mean square end-to-end distance

$$\langle R^2 \rangle_0 = Nl^2 = C_\infty n a^2$$

Therefore,

$$N = \frac{L^2}{\langle R^2 \rangle_0} = \frac{n \cos^2\left(\frac{\theta}{2}\right)}{C_\infty}$$

$$l = \frac{\langle R^2 \rangle_0}{L} = \frac{C_\infty a}{\cos\left(\frac{\theta}{2}\right)}$$

1.7. Home work problem:

1.7.1. For polymethylene chains, the characteristic ratio is 6.87 and θ =68°. Calculate the Kuhn segment length in terms of the bond length and the number of monomers.