$$H_{ds} = \frac{l_p^{ds}}{2} \int_0^L \left(\frac{\partial t}{\partial s} \right)^2 ds$$

$$H_{ss(1)} = \frac{l_p^{ss}}{2} \int_0^L \left(\frac{\partial t}{\partial s_1} \right)^2 ds_1 \qquad H_{ss(2)} = \frac{l_p^{ss}}{2} \int_0^L \left(\frac{\partial t}{\partial s_2} \right)^2 ds_2$$

$$H_{1,2} = \int_0^L \int_0^L ds_1 ds_2 \varepsilon(|r_1(s_1) - r_2(s_2)|) \quad \varepsilon\big(\ldots\big)$$ **is energy density in some form**

$$H_{ds} = H_{ss(1)} + H_{ss(2)} + H_{1,2}$$

It may be possible to get a relationship of $l_p^{ds} = f(l_p^{ss}, \varepsilon)$