

Twisted escaped radial (TER) configuration calculations

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1 Frank free energy

Parameters α and β are defined so that the director $\hat{\mathbf{n}}$ is given by:

$$\hat{\mathbf{n}} = \cos \alpha \sin \beta \hat{\mathbf{r}} + \sin \alpha \sin \beta \hat{\boldsymbol{\varphi}} + \cos \beta \hat{\mathbf{z}} \quad (1)$$

Then the corresponding Frank free energy is given by:

$$\begin{aligned} F = \frac{1}{2r^2} & \left[K_1 (-r \sin(\alpha) \sin(\beta) \alpha_r + r \cos(\alpha) \cos(\beta) \beta_r + \sin(\beta) \cos(\alpha))^2 \right. \\ & + \frac{K_2}{16} (-r \sin(\alpha - 2\beta) \alpha_r + r \sin(\alpha + 2\beta) \alpha_r + 4r \sin(\alpha) \beta_r + \cos(\alpha - 2\beta) - \cos(\alpha + 2\beta))^2 \\ & + K_3 \sin^2(\beta) \left(-r^2 \sin^2(\alpha) \sin^2(\beta) (\alpha_r)^2 - r^2 \sin^2(\alpha) (\beta_r)^2 + r^2 \sin^2(\beta) (\alpha_r)^2 \right. \\ & \left. \left. + r^2 (\beta_r)^2 + 2r \sin(\alpha) \sin^2(\beta) \cos(\alpha) \alpha_r + \sin^2(\alpha) \sin^2(\beta) \right) \right] \quad (2) \end{aligned}$$