Motivated by the recent experimental results suggesting that the low temperature nematic phase of symmetric dimers[1-5], known as Nx phase, exhibits spontaneous director deformations, we have developed a molecular field theory for the segmental order of flexible molecules in nematic phases presenting distortions of the director field.

The suggested potential of mean torque of is an extension of the “chord model”[6], that has been successfully used for the description of segmental orientational ordering of flexible molecules in uniform uniaxial nematic media. We extend the formulation of the orientational potential of mean torque to take explicitly into account the coupling of the molecular conformations to possible twist, bent and splay deformations of the medium, in addition to the primary coupling to the local director.

The proposed model yields a consistent description of the essential features of the segmental ordering of small achiral-molecules dissolved in chiral nematic phases[7] as derived from NMR measurements. The model describes very well the segmental order profile of symmetric dimers[2-5] in their nematic phases, measured by NMR, and suggests a clear picture for the conformational changes associated with the N-Nx phase transition.

References:

* presenting author; E-mail: anantphyU@gmail.com