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Interlayer interactions in ferroelectric liquid crystals[1] MEHDI HAMANEH, PHILIP TAYLOR, Case Western Reserve University — We have recently drawn attention to a physical mechanism that can lead to an aligning interaction between distant layers in a ferroelectric smectic-C* liquid crystal. This effect arises because the amplitude of thermal fluctuations in layer shape is sensitive to correlations in c-director orientation in layers that are not nearest neighbors. This makes the entropy of the system dependent on the relative alignment of the c-director in all the smectic layers. In earlier treatments of this problem, a mean-field approximation was made in order to obtain an order-of-magnitude estimate of the strength of the interlayer interaction. While this was sufficient to demonstrate the significance of the mechanism, it led to an overestimate of the overall strength of the interaction because it included a self-energy term related to the anisotropy of a single layer. We have now remedied this shortcoming by evaluating in more detail the interlayer interaction due to layer shape fluctuations. We find that the rate at which the interaction decays as a function of interlayer distance does not follow any simple power-law form, but depends on a number of material parameters.

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