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Average band structure of smectic C? type random materials
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— We consider a Smectic C? type structure which exhibits alignment fluctuations which can be described by noise associated with both director angles. We take the propagation of axially incident electromagnetic waves, and from Maxwell equations, we establish the stochastic governing set of equations corresponding to optical phenomena. We note that this set of equations can be expressed as a linear vector stochastic system of differential equations with multiplicative noise. We use a procedure to calculate from the stochastic differential set of equations, the governing equations for the expected value of the electromagnetic transverse magnetic and electric fields for a certain autocorrelation function, and calculate explicitly their corresponding band structure for a particular spectral noise density. We have shown that the average resulting electromagnetic fields exhibit a biased decaying exponential dependence which impedes to propagate the waves in one sense while it permits them in the other sense. We have also found a remarkable widening of the band gap and the appearance of new local maxima for the modes without band gap.

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