Polymers in anisotropic environment with extended defects

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The conformational properties of flexible polymers in d dimensions in the environment with extended defects are analyzed both analytically and numerically. We consider the model with structural defects correlated in ε_d dimensions and randomly distributed in remaining $d - \varepsilon_d$ [1] (the case $\varepsilon_d = 1$ describes defects in the form of parallel lines). Within the lattice model of self-avoiding random walks (SAW) we apply both the pruned-enriched Rosenbluth method (PERM) and exact enumerations algorithm. Anisotropy of the environment causes existence of two distinct characteristic length scales and leads to distinction in polymer properties in directions parallel and perpendicular to extended defects. Scaling exponents and shape properties of polymers are analyzed numerically for the wide range of concentrations of defects. Analytical description of the model is developed within the des Cloizeaux direct polymer renormalization scheme.

References

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