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Interpenetration of two chains different in sizes: some exact results

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Abstract

A model of two interacting polymer chains has been proposed to study the effect of penetration of one chain into the other. We show that small chain penetrates more in comparison to the long chain. We also find a condition in which both chains cannot grow on their own (or polymerize) but can grow (polymerize) in zipped form.

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In recent papers [1–4], it has been shown that the lattice model of self-attracting-self-avoiding walks (SASAWs) [5–7] may be used to study the critical behavior of two chemically different interacting polymer chains in a solution which may be of different types (good or poor) for different chain. We reported transition from zipped state to segregated state by varying the solvent quality, the temperature and the interaction between monomers of inter-chain and intra-chain. The model proposed by us takes into account the physical condition that the interaction between monomers is repulsive at short distance and attractive at large distance. The non-crossing constraint represents the repulsion, and the attraction between monomers occupying the neighboring lattice site is due to the attractive part of the interaction. This model is termed as two-interacting walks (TIWs) and is solved exactly for truncated n-simplex lattice ($n = 4$, 5 and 6) using real space renormalization group calculation. The mean number of monomers

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cases is in the compact phase as is evident from eigenvalue listed in Tables 1, 2 and 3. Apart from this in all other cases when chains are in either **T** or **C** state, the value of y is found to be less than 1.

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