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Statistical Mechanics of Real Polymer Chains

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We study the physical properties of polymers that do not depend on the exact chemical and structural details of a particular polymer chain and demonstrate some universal properties of the system which can be analyzed in the framework of the renormalization group methods. We apply the massive field theory approach in fixed space dimensions $d < 4$ in order to investigate the process of polymer adsorption-desorption in semi-infinite space confined by one wall [1] and for investigation of dilute polymer solutions of real polymer chains in a good solvent between two parallel repulsive walls, two inert walls and for the mixed case of one repulsive and one inert wall [2]. Our analytical results are in good agreement with previous theoretical predictions, experimental data and results of Monte-Carlo calculations.

- [1] Z.Usatenko, *J.Stat.Mech.:Theory Exp.* (2006), p. 03009; Z.Usatenko, J.-U.Sommer *J.Stat.Mech.:Theory Exp.* (2007), p. 10006.
[2] D.Romeis, Z.Usatenko *Phys.Rev.E* 80 (2009), p. 041802.