ELSEVIER

Physica A 224 (1996) 239-247

PHYSICA A

Polymers with randomness: phases and phase transitions

Somendra M. Bhattacharjee [1], Sutapa Mukherji [2]

Institute of Physics, Bhubaneswar 751 005, India

Abstract

We discuss various aspects of the randomly interacting directed polymers with emphasis on the phases and phase transition. We also discuss the behaviour of overlaps of directed paths in a random medium.

1. Introduction

Polymers with randomness can be classified into two categories: (1) random medium, and (2) random interaction, analogous to the random field and random bond problems for magnets. These random problems remain notoriously difficult [1]. Attention has therefore gradually shifted to simpler models, and for the past ten years directed polymers played a crucial role in unraveling various issues concerning disordered systems. This model is also important because of its rich behavior, and connection with nonequilibrium surface growth problem with noise, flux line pinning in dirty samples etc. [2]. We like to give an overview of the problem of randomly interacting directed polymers.

The pure problem is discussed in the second section. The randomly interacting model and its field theoretic study can be found in Section 3. An exact real space renormalization group approach to study the finite size effect is given in Section 4. The question of overlap of two paths in a random medium that can be recast as a problem of interacting directed polymers in a random medium is explored in Section 5. A summary is given in Section 6.

[1] E-mail address: sb@iopb.ernet.in

[2] E-mail address: sutapa@iopb.ernet.in

SSDI 0378-4371(95)00324-X