On the Statistical Physics of Directed Polymers in a Random Medium and Their Relation to Tree–Structured Lossy Compression*

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Abstract

Using well–known results from statistical physics, concerning the almost–sure behavior of the free energy of directed polymers in a random medium, we prove that a certain ensemble of tree–structured rate–distortion codes with delayless decoding, asymptotically achieves the rate–distortion function under a certain symmetry condition.

Index Terms: directed polymer, Cayley tree, free energy, partition function, tree–structured code, rate–distortion theory, delay.

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