Combinatorial Problems Raised by Statistical Mechanics
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Directed walk models of polymers subject to a force

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Abstract

Individual polymer molecules can be micromanipulated using atomic force microscopy where, typically, a tensile force is applied to the polymer. For instance a polymer adsorbed on a surface can be pulled off the surface or a polymer can be pulled from an energetically favourable solvent to a less favourable solvent. These situations can be modelled by directed walk models such as Dyck paths and the models can be analysed by rather simple combinatorial arguments. Perhaps surprisingly, these models catch much of the underlying physics of the problem. The talk will focus on several examples of these situations.