

# **A dynamical model for the description of protein-DNA interaction and facilitated diffusion**

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I present a dynamical model for non-specific DNA protein interactions, which is based on a previously developed wormlike chain model for DNA, and where the protein interacts with DNA through electrostatic and excluded-volume forces. I studied the properties of this model using a Brownian dynamics algorithm that takes hydrodynamic interactions into account and obtained results that essentially agree with experiments and most predictions of kinetic models. However, in contrast to some kinetic models, which predict that the maximum acceleration of DNA sampling due to facilitated diffusion may be as large as one hundred, this model suggests that this rate is in fact much smaller, of the order of two or even less (as also proved by several experiments). In the end I will discuss this contradiction and show that, for realistic conditions, the two types of models actually support each other and agree in predicting a low efficiency for facilitated diffusion.