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Frenkel-Kontorova model and Gibbs measures

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Abstract

First, we will introduce the one-dimensional Frenkel-Kontorova model and give some of its basic properties. We will then introduce the notion of ground and minimizing configurations, see if it exists (and eventually are unique) in this particular model, and explain the link with the notion of effective potential (Chou-Griffiths). We will define the Lax-Oleinik operators, and give several results about the model (rotation numbers, Aubry theory).

In a second part, we will look at this model from a different point of view (pure dynamic systems); defining Gibbs (or equilibrium) measures for a specific temperature, we will relate those to ground configurations and effective potentials, when the temperature goes to infinity.

In a last part, we will talk about the case when the potential is not coercive, and define a new type of Lax-Oleinik operator.