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A Journey into the Variational Formulation for the Kardar-Parisi-Zhang Growth Model

Starting from the time behavior of the functional (NEP) arising in the variational approach to the KPZ equation, we have studied fluctuation theorems in such a system, adapting a path-integral scheme that adequately fits to this kind of study dealing with unstable systems. We show how to proceed in order to obtain detailed as well as integral fluctuation theorems, and obtain particular numerical results in 1d, clearly showing the separation between internal and external entropy productions, we also present results for a “Thermodynamic Uncertainty Relation” (TUR). The path integral methodology, allows to show the relation between the NEP and the entropy production, as well as with the TUR.

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