Report to RDSES after a short visit (reference number: 824)

The visit :

This is a report on a visit by Ellen SAADA (France), to Christian MAES (Belgium) for 4 days, from November 7 to November 10, 2005. There was also present Frank REDIG (Leiden, Netherlands), to work together on two research projects described below.

Travel cost (in euros): 85 (second class train ticket Paris-Leuven AR) + 58,60 (taxi home-railway station AR; I use a taxi because I should not carry suitcases, due to a back problem).

Work carried out :

Our project was to work on two subjects:

1) Study of a superposition of a sandpile dynamics and another one in $\mathbb{Z}$

2) Probabilistic models for 'the origin of life'

We did not have time to work on this second subject, so our goal is to do it in our next meetings (either a visit from C. Maes and E. Saada to The Netherlands, and/or a visit of F. Redig to France, during the spring 2006).

We have worked on the sandpile model in infinite volume, in dimension one. This process lacks 'usual' properties of regular Markov processes, like the Feller property.

Our goal was to check whether (or how much) these non-regularities persist if we superpose another dynamics either 'regular' (a spin-flip one: pure spin flip as well as Glauber type or more general spin flip processes with positive rates) or also non-local (a variation of the sandpile one, that we call anti-sandpile), to the sandpile model: Could we recover the Feller property? What ergodicity properties are obtained?

In the first case and as a function of the sandpile intensity, there is a sharp transition from a non-trivial invariant measure to the invariant measure of the sandpile process. For the combination sandpile plus anti-sandpile, there is a sharp transition from one frozen state to the other anti-state.

Projected publication :

We have begun to write a paper with our first results, entitled tentatively:

"Freezing transitions in non-Fellerian particle systems".