

# A HIERARCHICAL RENORMALIZATION MODEL ON TREES

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We are interested in a hierarchical renormalization model introduced by Derrida and Retaux (2014). This model can be considered as a recursive equation on a binary tree:

$$X_{n+1} = (X_n^{(1)} + X_n^{(2)} - 1)^+,$$

where  $X_n^{(1)}$  and  $X_n^{(2)}$  are two independent copies of  $X_n$ . When  $X_n$  takes values in  $\mathbb{Z}_+$ , the critical regime was determined by Collet, Eckmann, Glaser and Martin (1984). We present some quantitative results on the free energy  $F_\infty$  near to the critical regime, where

$$F_\infty := \lim_{n \rightarrow \infty} 2^{-n} \mathbb{E}(X_n).$$

We shall also discuss several open questions on this model.

The talk is based on some joint works (in progress) with Xinxing Chen (Shanghai), Bernard Derrida (Collège de France), Nina Gantert (Munich), Mikhail A. Lifshits (St. Petersburg) and Zhan Shi (Paris 6).

## REFERENCES

- [1] P. Collet, P. Eckmann, J.P. Glaser and A. Martin, *Study of the iterations of a mapping associated to a spin-glass model*. Comm. Math. Phys. (1984), vol. 94, 353-370.
- [2] B. Derrida and M. Retaux, *The depinning transition in presence of disorder: a toy model*. J. Stat. Phys. (2014), vol. 156, 268-290.