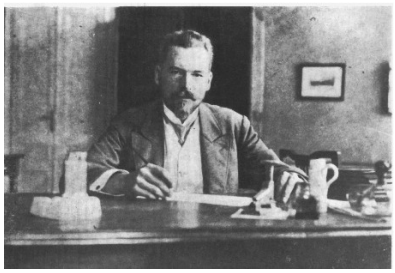

Contribution ID: **7** Type: **talk**

Emergence of Kardar-Parisi-Zhang dynamics from the etching model: A nonphenomenological description.

Monday, 3 September 2018 16:30 (45 minutes)

In a recent work [1] a method to derive analytically the roughness evolution was exposed. The method allows to obtain analytically the growths exponents of a surface of $1+1$ dimensions whose dynamics is ruled by cellular automata. The method was successfully applied to the etching model[2,3] and the dynamical exponents where obtained. Those exponents are exact and they are the same as those exhibited by the KPZ model[4] for this dimension. Here we revisit the dynamics of corrosion of an interface and we define a distribution of height difference $P(h_i - h_j)$, between a site i and its first neighbour j. We present a simple proof that in the continuous limit the etching mechanism leads us to the Kardar-Parisi-Zhang (KPZ) equation in a $d+1$ dimensional space. We show that the parameter λ associated with the nonlinear term of the KPZ equation is not phenomenological, rather it stems from $P(h_i - h_j)$. The Galilean invariance is recovered independent of d, and we illustrate this via very precise numerical simulations. Moreover, we strengthen the argument that there is no upper critical limit for the KPZ equation [6].\\

references

[1] W. S. Alves, E. A. rodrigues, H. A. Fernandes, B. A. Mello, F. A. Oliveira and I. V. L. Costa. Phys. Rev. E 94, 042119 (2016).

[2] B. A. Mello, A. S. Chaves, and F. A. Oliveira, Phys. Rev. E \textbf{63}, 041113 (2001).

[3] E. A. Rodrigues, B. A. Mello, and F. A. Oliveira, J. Phys. A {\bf 48}, 035001 (2015).
[4] M. Kardar, G. Parisi, and Y. C. Zhang, Phys. Rev. Lett. {\bf 56}, 9, 889 (1986).

[5] Halpin-Healy T J and Zhang C-Y, Phys. Rep. 254 215 (1995);
Marsili M, Maritan A, Toigo F and Banavar J R Rev. Mod. Phys. 68 963 (1996).

[6] W. R. J. Gomes and F. A. Oliveira to be published.

Primary author: Prof. OLIVEIRA, Fernando (Universidade de Brasília)

Co-authors: GOMES, Waldenor (University of Brasilia); ALVES, Washington (University of Brasilia)

Presenter: Prof. OLIVEIRA, Fernando (Universidade de Brasília)

Session Classification: Mon evening