Random spatial growth with paralyzing obstacles

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This talk will be based on a recent article in collaboration with J. van den Berg, Y. Peres and V. Sidoravicius (to appear in Ann. I Henri Poincare) We study a spatial growth processes where initially there are sources of growth (indicated by the colour green) and sources of a growth-stopping (paralyzing) substance (indicated by red). The green sources expand and may merge with others (there is no `inter-green' competition). The red substance remains passive as long as it is isolated. However, when a green cluster comes in touch with the red substance, it is immediately invaded by the latter, stops growing and starts to act as red substance itself. In our main model space is represented by a graph, of which initially each vertex is randomly green, red or white (vacant), and the growth of the green clusters is similar to that in first-passage percolation. The main issues we investigate are whether the model is well-defined on an infinite graph (e.g. the square lattice), and what can be said about the distribution of the size of a green cluster just before it is paralyzed. For the d-dimensional cubic lattice we show that, if the initial density of red vertices is positive, and that of white vertices is sufficiently small, the model is indeed well-defined and the above distribution has an exponential tail. In fact, we believe this to be true whenever the initial density of red is positive.