Williams Decomposotion for Superprocesses

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Abstract: We are interested in a spinal decomposition for superprocesses involving the ancestral lineage of the last individual alive (Williams' decomposition).

For superprocesses with homogeneous branching mechanism, the spatial motion is independent of the genealogical structure. As a consequence, the law of the ancestral lineage of the last individual alive does not distinguish from the original motion. Therefore, in this setting, the description of $X^{(h_0)}$ may be deduced from Abraham and Delmas (2009) where no spatial motion is taken into account.

For nonhomogeneous branching mechanisms on the contrary, the law of the ancestral lineage of the last individual alive should depend on the distance to the extinction time h_0. Using the Brownian snake, Delmas and Hénard (2013) provide a description of the genealogy for superprocesses with the following non-homogeneous branching mechanism

$$\psi(x, z) = a(x)z + \beta(x)z^2$$

with the functions a and β satisfying some conditions.

We would like to find conditions such that the Williams' decomposition works for superprocesses with general non-homogeneous branching mechanisms. The conditions should be easy to check and satisfied by a lot of superpossess. The talk is based on a working paper with Renming Song and Rui Zhang.

References

[1] R. Abraham and J.-F. Delmas (2012). A continuum-tree-valued Markov process, *Ann. of Probab.*, **40**, 1167–1211.

[2] Delmas, J. F. and Hénard, O.(2013). A williams decomposition for spatially dependent super-processes. *Electron. J. Probab.*, **18** , 1–43.