

### **7th talk : Fine Properties of the Optimal Skorokhod Embedding Problem.**

*vendredi 5 juillet 2019 10:50 (50 minutes)*

We study the problem of stopping a Brownian motion at a given distribution  $\nu$  while optimizing a reward function that depends on the (possibly randomized) stopping time and the Brownian motion. Our first result establishes that the set  $T(\nu)$  of stopping times embedding  $\nu$  is weakly dense in the set  $R(\nu)$  of randomized embeddings. In particular, the optimal Skorokhod embedding problem over  $T(\nu)$  has the same value as the relaxed one over  $R(\nu)$  when the reward function is semicontinuous, which parallels a fundamental result about Monge maps and Kantorovich couplings in optimal transport. A second part studies the dual optimization in the sense of linear programming. While existence of a dual solution failed in previous formulations, we introduce a relaxation of the dual problem and establish existence of solutions as well as absence of a duality gap, even for irregular reward functions. This leads to a monotonicity principle which complements the key theorem of Beiglbock, Cox and Huesmann. These results can be applied to characterize the geometry of optimal embeddings through a variational condition. (Joint work with Mathias Beiglbock and Florian Stebegg) over the years.

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