Route Planning Problems and Hybrid Control

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In its simplest formulation, the so-called *route planning problem* for sailing boats consists in minimizing the expected time to reach a given target for a vessel sailing in a partly stochastic wind field. A change of direction (especially when *tacking*) might be associated to a time loss, which is in fact a crucial point in short-course races. This transition cost makes it natural to formulate the problem in term of *stochastic hybrid control* (see [BM, FF]). The related numerical dynamic programming techniques have been studied in [FZ] for the case of deterministic systems, and extended in [FF] to the the specific framework of route planning.

In this talk, we will discuss a detailed hybrid model to formulate the optimal route planning in the case of both fleet races and match races, and provide a convergent numerical approximation. We will also present numerical examples showing the good agreement between the proposed model and the heuristically known features of the optimal strategy.

References

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