

FPCA applied to flight paths optimization

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Abstract— In this paper, we detail the steps that lead to optimized trajectories according to a selected criterion, in a low dimensional space. After presenting the main techniques for optimizing flight paths, as well as methods for reducing the size of the state space, we precise the modeling of our problem. We use the Karhunen-Loève transformation, or Functional Principal Components Analysis (FPCA), as our main tool to model the state space. We also select the constraints undergone by our airplane: here, we decide only to consider the impact of the wind. For its simplicity, the Simulated Annealing (SA) is chosen in order to find the optimized trajectory. Thus, once the modeling is finished, we launch our simulations and proceed to an analysis of our results.