1023-49-1227 **Darryl K. Ahner*** (darryl.ahner@us.army.mil). *Stochastic UAV Route Planning Using Adaptive Dynamic Programming.* Preliminary report.

We consider the problem of automatic routing and scheduling of Unmanned Aerial Vehicles (UAVs) in a dynamic stochastic environment motivated by surveillance applications. The problems associated with UAVs in surveillance operations involve uncertain effects such as the risk of UAV loss, arrival of new tasks, and the need for real-time adaptations. Such problems can be formulated as dynamic scheduling problems under uncertainty, and can be solved in principle by stochastic dynamic programming techniques. However, due to the size and complexity of the state space in these problems, dynamic programming becomes intractable. We develop an approximate dynamic programming approach using model predictive control. Current control actions are determined at each time by solving a finite horizon control formulation based on the current state. As new information is acquired, the problems are reformulated and solved to obtain revised controls. We investigate an approximate dynamic programming approach for model predictive control, accounting for various levels of risk and uncertainty. We develop a class of simulation-based algorithms that iteratively learn piece-wise linear cost-to-go approximations that can be used in approximate dynamic programming to generate fast optimal strategies. (Received September 25, 2006)