Meeting: 1001, Evanston, Illinois, SS 15A, Special Session on Mathematical Problems in Robotics

1001-68-328 **Anna Yershova*** (`yershova@uiuc.edu`), 3340 Thomas M. Siebel Center, 201 N. Goodwin, Urbana, IL 61801, and **Steven M. LaValle**. *Deterministic Sampling Methods for Spheres and SO(3)*.

Generating uniform samples over spheres and three-dimensional rotation group is important for many applications, including motion planning, optimization, and verification problems in robotics and related areas such as graphics, control theory and computational biology. However, it is a very challenging problem.

We are particularly interested in issues arising in sampling techniques for motion planning, including uniform and regular sampling, sampling criteria and topological considerations. Building on the quasi-Monte Carlo sampling literature, we have developed extensible lattices that try to minimize dispersion, and some forms of discrepancy, over spheres and three-dimensional rotation group, SO(3). Incremental quality and explicit neighborhood structure make them particularly suited for sampling-based motion planning methods. Their deterministic nature allows resolution completeness guarantees. We have conducted simulation studies using these methods on motion planning problems. (Received August 30, 2004)