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Taeyoung Lee* (tylee@gwu.edu), 801 22nd St NW, Washington, DC 20052. *Stochastic Optimal Motion Planning and Estimation for the Attitude Kinematics on $SO(3)$.*

Stochastic motion planning and estimation for the attitude kinematics of a rigid body are studied. Fokker-Planck equation on the special orthogonal group is numerically solved via noncommutative harmonic analysis to propagate probability density functions through the flow of attitude kinematics. Based on this, a stochastic optimal control problem is formulated for motion planning, and a Bayesian framework is applied for estimation. The proposed intrinsic, geometric formulation does not require the common assumption that uncertainties are Gaussian or localized. It can be also applied to complex rotational maneuvers of a rigid body without singularities in a unified way. The desirable properties are illustrated by numerical examples. (Received January 27, 2014)