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Eric B Auld* (imurme8@yahoo.com), 1214 S Farmer Ave, #B103, Tempe, AZ 85281. *Topological Obstructions to Consensus on $SO(3)$* .

In this work we examine the topological obstructions to consensus on Lie Groups, with particular reference to $SO(3)$, the space of orthogonal matrices with determinant equal to 1. In decentralized control on Lie Groups, we encounter topological obstructions to consensus which are instructive in their own right about the topology of the given space. We propose a feedback law and examine its properties by way of simulation. Our animations start with random elements of $SO(3)^n$ and apply to them a feedback law of our own device. We examine the conditions under which it converges, and discuss what topological properties of $SO(3)$ present obstacles to consensus. For example, the fact that $SO(3)$ is not simply connected is a frequent obstacle to consensus. To support our simulations, we present analytic results concerning the stability of points in $SO(3)$ under our algorithm, and examine which conditions may be necessary and/or sufficient to ensure convergence to such points. (Received September 23, 2011)