1023-93-1815 **Dov J Rhodes*** (dorhodes@indiana.edu), 320 E. University St., Apt. 5, Bloomington, IN 47401, and **Nathan Olson** (nmolson@csupomona.edu). *The Pivotal Role of Commutators in Action.* Preliminary report.

We develop a Lyapunov-based method to construct control equations for a non-tilting disk that is rolling without slipping. The challenge is to overcome the difficulties of a fundamentally non-holonomic system. Given two control parameters, and five state-space variables, we use Lie brackets to effectively "holonomize" a non-holonomic system. Then we convert this system of artificially actuated controls into a time-dependent system of real controls. This is a simplified version of the unicycle control problem.

Note: In 20 minutes, we would mainly like to discuss the general features of a non-holonomic system, its difficulties, and maybe a little on how to solve them. (Received September 26, 2006)