1145-05-2408 **Xiao Xie***, xxie6@jhu.edu, and **Elanor West**. *Multi-Step Strategies for Rendezvous Search on the Platonic Solids.* Preliminary report.

The Astronaut Problem is an open problem in the field of rendezvous search. The premise is two astronauts randomly land on a planet and want to find each other. Research explores what strategies accomplish this in the least expected time. To investigate this problem, we create a discrete model which takes place on the edges of the Platonic solids. Some baseline rules of the model are (1) the agents can see all of the faces around them. (2) they travel along the edges from node to node and cannot jump. (3) they move at a rate of one edge length per unit time. We first explore an unbiased random walk strategy where the agents move randomly on each turn. We then explore multi-step strategies, which are strategies where both agents move randomly for one step, and then follow a pre-determined sequence. We compare the performance of these strategies on all of the solids. For the cube and octahedron specifically, we are able to prove optimality of the "Left Strategy", in which the agents move randomly and then turn left. In addition, we compare results across the solids, looking for patterns that can give insight into a possibly optimal strategy for the sphere. Most of the calculations were done using first-order Markov Chains. (Received September 25, 2018)