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Title: *"Generating heteroclinic chains in a planar restricted 4-body problem"*

Abstract. Heteroclinic connections allow a spacecraft to naturally travel between libration point orbits in the Sun-Earth and Earth-Moon systems. Connections exist not only within a system but also between systems. The current work considers motion in a Sun-Earth-Moon planar restricted 4-body problem, which allows both cases to be studied using a single model. Since the transfers are not isolated, this work is founded on a 2-parameter continuation algorithm to automatically map out the full connection space within each heteroclinic family.

By expressing each computed family's boundary conditions in an appropriate coordinate set, linking planar connections is reduced to locating intersections between regions on a plane. An approximate trajectory can be constructed that follows a prescribed itinerary between the Sun-Earth and Earth-Moon libration points. Since the spacecraft is shadowing a heteroclinic connection chain (i.e., it departs each libration point orbit after a specified number of revolutions), we include a corrections procedure to refine the complete trajectory within the 4-body model.

The resulting trajectory allows a spacecraft to tour the libration points using very little fuel. Since the model is non-autonomous (the influences of the Sun, Earth, and Moon are included simultaneously), libration point orbits at different energy levels can be naturally connected. We intend to demonstrate that transfer chains including multiple switches between the Sun-Earth and Earth-Moon systems are possible.

Joint work with Daniel J. Scheeres, University of Colorado Boulder.