Halo orbit mission correction maneuvers using optimal control

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This paper addresses the computation of the required trajectory correction maneuvers for a halo orbit space mission to compensate for the launch velocity errors introduced by inaccuracies of the launch vehicle. By combining dynamical systems theory with optimal control techniques, we are able to provide a compelling portrait of the complex landscape of the trajectory design space. This approach enables automation of the analysis to perform parametric studies that simply were not available to mission designers a few years ago, such as how the magnitude of the errors and the timing of the first trajectory correction maneuver affects the correction $\triangle V$. The impetus for combining dynamical systems theory and optimal control in this problem arises from design issues for the *Genesis Discovery Mission* being developed for NASA by the Jet Propulsion Laboratory.