

# Continuation from a flat to a round Earth model in the coplanar orbit transfer problem

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**Résumé** : In this presentation we focus on the problem of minimization of the consumption for the coplanar orbit transfer problem. This problem is usually solved numerically by a shooting method, based on the application of the Pontryagin Maximum Principle, however the shooting method is known to be hard to initialize and the convergence is difficult to obtain due to discontinuities of the optimal control. Several tricks are known in order to overcome that problem, however in this article we introduce a new approach based on the following preliminary remark. When considering a 2D flat Earth model with constant gravity, the optimal control problem of passing from an initial configuration to some final configuration by minimizing the consumption can be very efficiently solved, and the solution leads to an extremely efficient algorithm. Based on that, we propose a continuous deformation from this flat Earth model to a modified flat Earth model that is diffeomorphic to the usual round Earth model. The resulting numerical continuation process thus provides a new way to solve the problem of minimization of the consumption for the coplanar orbit transfer problem.