From: **Daniel Adamo** adamod@earthlink.net
Subject: Re: Estimating In-Plane Launch Time Targeting Rendezvous
Date: November 8, 2025 at 3:29 PM
To: ATIG (L-Z) adamod@earthlink.net

DA

ATIG Members-

Further progress with implementing a general-purpose launch trajectory simulation has led to an R2 revision of this paper as attached. The added topic is post-launch powered flight steering into the desired orbit plane and somewhat exceeds the subject scope. This planar steering discussion is confined to the last two pages of R2 as an Epilogue. The algorithm iteratively refining launch time has a great deal of commonality with the new R2 material, as a reading of the Epilogue will reveal. Continued comments on this paper are welcome.

-Dan

From: Daniel Adamo <adamod@earthlink.net>
Date: Saturday, October 11, 2025 at 17:43
Subject: Re: Estimating In-Plane Launch Time Targeting Rendezvous

ATIG Members-

Further testing and review of the white paper emailed September 29 PDT in this thread has resulted in multiple corrections and additions. The R1 paper reflecting these edits is attached, and it completely supersedes last month's R0 version. Multiple-angle formulae (Equations 11 and 14) now contribute to improved iteration stability, and an error in southbound logic supporting Equation 9 has been corrected. Additional test data relating to a hypothetical launch from KSC LC-39B and targeting rendezvous with HST have been added.

Additional reading on launch window targeting by Space Shuttle Flight Design engineers has revealed a similar algorithm to the attached paper was in use by those personnel. The document is cited below for the record.

Orbit Flight Design, Flight Design and Dynamics Department, *Launch Window Design 03, LNCH WND 03 21007*, "Rendezvous Launch Window", Section 2.3.1 (Determining In-plane Time), Rockwell Space Operation Company, 5 August 1994.

If anyone can inform me how this document would be accessed by the public nowadays, I'll gladly provide that citation in a future revision of the attached paper. My Internet search came up empty.

-Dan

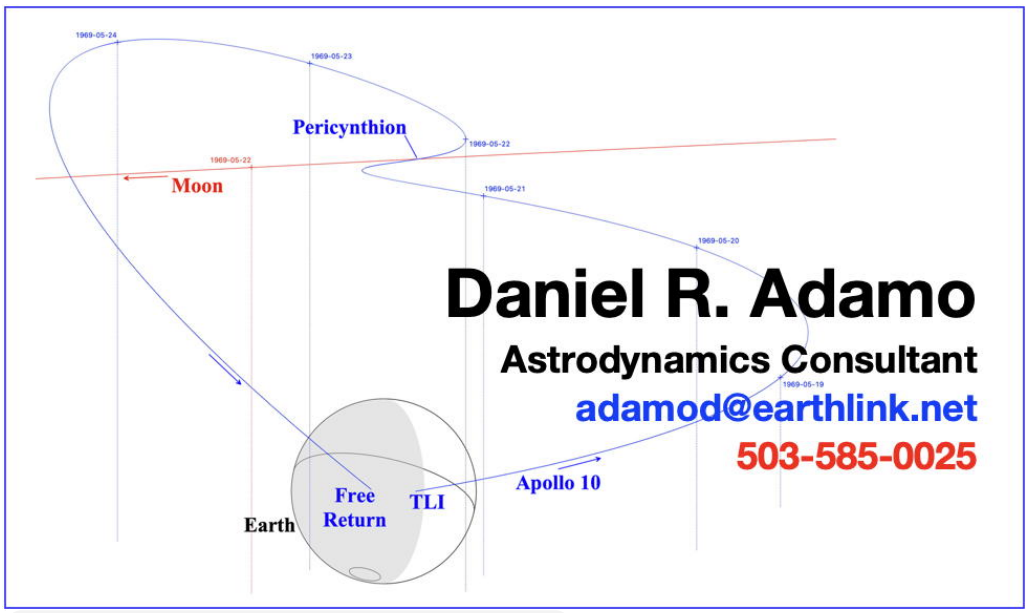
From: Daniel Adamo <adamod@earthlink.net>
Date: Monday, September 29, 2025 at 21:29
Subject: Estimating In-Plane Launch Time Targeting Rendezvous

ATIG Members-

The coming winter's programming project will focus on developing a vehicle-configurable launch simulation targeting rendezvous with an orbiting satellite. In many use scenarios, launch time for the simulation will be completely unknown, or at most only a calendar date will be specified.

The attached paper describes an iterative algorithm serving as a pre-processor for the simulation. With few inputs beyond a specified orbiting target ephemeris and an initial launch date/time guess, the algorithm rapidly converges on a launch time at which the launch site lies in the target's geometric orbit plane. This converged in-plane launch time will then serve as a starting point from which the simulation can determine performance-optimal/marginal launch times leading to rendezvous with the orbiting target. Comments and questions on the attachment are invited.

-Dan



GeometricInplaneTimeR2.pdf
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