Optimal Cotangential Orbital Transfer Maneuvers

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Abstract. In this paper, optimal two impulses cotangential orbital transfer maneuvers is developed for which: 1. Both the inner and transfer orbits are of arbitrary shapes (circular, elliptic, parabolic or hyperbolic). 2. The two impulses are applied tangentially at two general points r_1 and r_2 not necessarily to be applied at the apsides.

The solution of the problem is thus; the determination of, the semi-major axis a_T and the eccentricity e_T of the transfer orbit, and the total impulse for the complete two impulse transfer at r_1 and r_2 which gives minimum velocity increment. Some numerical applications are also included.

Keywords: Astrodynamics – orbital maneuvers – trajectory optimization.