



UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH

Escola Superior d'Enginyeries Industrial,
Aeroespacial i Audiovisual de Terrassa

Interplanetary trajectories

Example: Earth to Mars case

Report

Degree: Master's degree in Aerospace Engineering

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Students: Fontanes Molina, Pol; Martínez Viol, Víctor; Urbano González, Eva María

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1 | Figure example formats

FIGURE

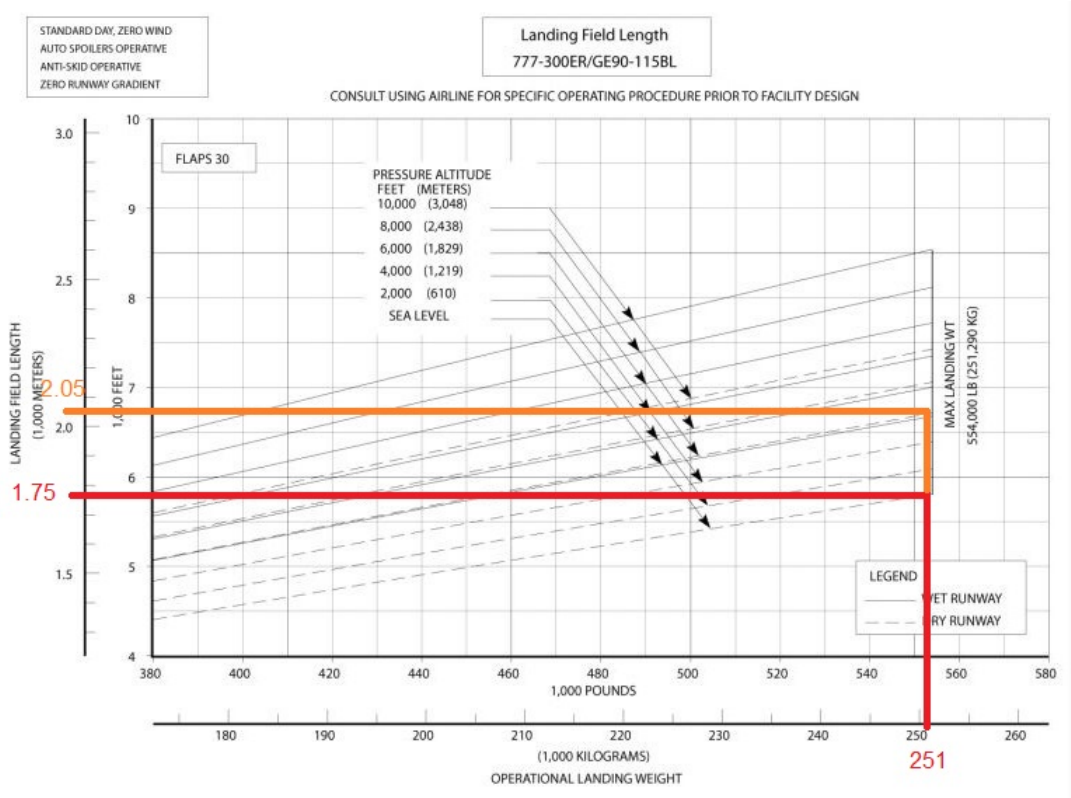


Figure 1.0.1: Landing distance vs MTOW for the Boeing 777.

TABLE

T_1	13 cm
T_2	21 cm
T_3	62 cm
T_t	95 cm

Table 1.0.1: Thickness after the materials correction factor.

2 | Aim

This project aims to compute an interplanetary trajectory which, for a given ecliptic rectangular positions of two planets in two known time instances, is able to carry a spaceship with a unique impulse, from the first planet to the second.

3 | Theoretical background

3.1 Planetary orbits and approximations analysis

3.1.1 Patched Conic Approximation (PCA)

3.1.1.1 1st. Geocentric stage

3.1.1.2 2nd. Heliocentric stage

3.1.1.3 3rd. Planetocentric stage

4 | Calculations and results

4.1 Verification calculations

4.2 Main interplanetary orbit calculations

5 | Conclusions

6 | Bibliography

- [1] J. Calaf, "Trajectòries interplanetàries: Patched Conic Approximation," 2017.
- [2] —, "Trajectòries interplanetàries," 2017.
- [3] —, "Treballs de Mecànica Orbital," 2017.