

# Final Rankings and Brief Descriptions of the Returned Solutions and Methods Used for the 2<sup>nd</sup> Global Trajectory Optimisation Competition

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## Overview

The problem posed for the 2<sup>nd</sup> Global Trajectory Optimisation Competition was announced on 06 November 2006. Of the 26 registered teams, 15 teams responded by the deadline of 04 December 2006. Eleven of the returned solutions were found to be complete solutions in the sense that they satisfied all of the constraints of the problem, or had only minor or moderate constraint violations which were deemed small enough that no significant penalty on the reported merit function was warranted. These eleven solutions were thus ranked according to the reported merit function,  $J$ . Three solutions were either partial or violated the constraints so significantly that it was not clear how to penalise the reported merit function. Hence these solutions were not ranked. Lastly, one response consisted of a proposed method without a reported solution. The rankings are summarised in Table 1. Tables 2 and 3 provide additional information about the solutions returned. All teams visited Group 4 first and Group 1 last, based on increasing orbital energy. Most teams used a countdown group sequence: 4,3,2,1. The remaining sections of this document describe briefly the teams' methods, based on the brief descriptions returned by the teams.

Table 1: Ranking of Returned Solutions

Rank	Team	$J$ (kg/yr)
1	4: Politecnico di Torino	98.64
2	13: Moscow Aviation Institute, and Khrunichev State Research and Production Space Center	87.93
3	10: Advanced Concepts Team, ESA	87.05
4	15: Centre National d'Etudes Spatiales (CNES)	85.43
5	1: GMV Aerospace and Defence	85.28
6	2: German Aerospace Center (DLR)	84.48
7	9: Politecnico di Milano	82.48
8	19: Alcatel Alenia Space	76.37
9	14: Moscow State University	75.08
10	7: Tsinghua University	56.87
11	18: Carnegie Mellon University, J.J. Arrieta-Camacho	27.94
–	17: University of Glasgow, <i>et al.</i>	73.87 <sup>a</sup>
–	21: Technical University of Delft and Dutch Space	15.95 <sup>b</sup>
–	23: Facultes Universitaires Notre-Dame de la Paix (FUNDP)	– <sup>c</sup>
–	26: University of Maribor, Bostjan Eferl	– <sup>d</sup>

<sup>a</sup> Significant position and velocity violations at the asteroids and Earth

<sup>b</sup> Significant position and velocity violations at the asteroids and Earth, and flight time limit violation

<sup>c</sup> Only one leg computed (Earth to Group 4)

<sup>d</sup> Only a proposed method described, no solution computed

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