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Technical Comments

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Reply by the Authors to P. Sengupta

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Sengupta [1] presents an approach to finding closed form solutions to two integrals in a paper by Zanon and Campbell [2]. There are two pertinent comments to this technical note. First, the two integrals in [2] can indeed be solved in closed form using an approach that is similar to that described in [1]. The authors have used these closed form integrals in their most recent work [3]. Second, in terms of their usefulness to the algorithm presented in [2], the formation planning theory is not altered and, computationally, the differences are minimal because of the speed of current spline functions. But, the closed form integrals of [1] nicely complete the optimal control problem setup of [2].

Whereas closed form integrals are solvable for thrust effects from constant or bang–bang control such as those in [2], the use of spline functions in the input control matrices is enabling for the more general case when the control is time varying. A good example of this is when a spacecraft and control thrusters are rotating in the relative reference frame, and the problem requires attitude dynamics or attitude constraints. This case is addressed in [3].

References

[1] Sengupta, P., "Comment on 'Optimal Planner for Spacecraft Formations in Elliptical Orbits'," submitted to *Journal of Guidance, Control, and Dynamics*, Vol. 29, No. 6, 2006, pp. XXXX.
[2] Zanon, D., and Campbell, M., "Optimal Planner for Spacecraft Formations in Elliptical Orbits," *Journal of Guidance, Control, and Dynamics*, Vol. 29, No. 1, 2006, pp. 161–171.
[3] Zanon, D., and Campbell, M., "Spacecraft Formation Fuel Optimal Maneuvers with Attitude Constraints," AIAA Paper 2006-6588, 2006.

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