

Modeling and Exploring the Tradespace

Week 5 Framing

Required Reading:

McManus, H. L., SSPARC Book Material for Lecture 5.

Belegundu, A. D., Halberg, E., Yukish, M. A., and Simpson T. W., “Attribute-Based Multidisciplinary Optimization of Undersea Vehicles,” AIAA Paper 2000-4865, 8th AIAA/USAF/NASA/ISSMO Symposium on Multidisciplinary Analysis and Optimization, Long Beach, CA, Sept, 2000.

Stump, G., Simpson, T. W., Yukish, M., and Bennett, L., “Multidimensional Visualization and its Application to a Design-by-Shopping Paradigm,” AIAA Paper 2002-5622, 9th AIAA/ISSMO Symposium on Multidisciplinary Analysis and Optimization, Atlanta, GA, Sept. 2002.

Tools

Larson, W. J., and Wertz, J. R., *Space Mission Analysis and Design*, 3rd ed., Microcosm Press, El Segundo, CA., 1999, Chapter 11 in particular.

DSM Tutorial: <http://www.dsmweb.org/Tutorial/tutorial.htm>

<http://www.stk.com/>

<http://www.oculustech.com/co/>

<http://www.mathworks.com/>

Recommended Reading:

Contrasting design approaches:

Budianto, I. A., and Olds, J. R., “A Collaborative Optimization Approach to Design and Deployment of a Space-Based Infrared System Constellation,” 2000 IEEE Aerospace Conference Proceedings, Big Sky, Montana, March 2000, Vol. 1, pp. 385-393.

Owens, J. M., and Johnson, M. B., “Interplanetary Small Mission Studies”, 2001 IEEE Aerospace Conference Proceedings, Big Sky, Montana, March 2001, v.1, pp. 409-422.-

Recommended Reading (continued):

SSAPRC/GINA Trade Space Studies:

NOTE: these are mostly required readings from other weeks in the course. It may help to clarify the concept of tradespace exploration to read them now, but this is NOT required

TechSat and Broadband (wk 9): Walton, M. A, and Hastings, D. E., “Applications of Uncertainty Analysis Applied to Architecture Selection of Satellite Systems,” *Journal of Spacecraft and Rockets*, January 2004.

ATOS (wk 7): McManus, H. L., and Warmkessel, J. M., “Creating Advanced Architectures for Space Systems: Emergent Lessons from New Processes,” *Journal of Spacecraft and Rockets*, January 2004.

BTOS (wk 7): Weigel, A. L., and Hastings, D. E., “Measuring the Value of Designing for Uncertain Future Downward Budget Instabilities,” *Journal of Spacecraft and Rockets*, January 2004.

XTOS (wk 7): Ross, A. M., Diller, N. P., Hastings, D. E., and Warmkessel, J. M., “Multi-Attribute Tradespace Exploration as a Front-End for Effective Space System Design,” *Journal of Spacecraft and Rockets*, January 2004.

Spacetug (wk 3): McManus, H. L. and Schuman, T. E., “Understanding the Orbital Transfer Vehicle Trade Space,” AIAA Paper 2003-6370, Sept. 2003.

TPF (wk 8): Jilla, C. D., Miller, D. W., and Sedwick, R. J., “Application of Multidisciplinary Design Optimization Techniques to Distributed Satellite systems,” *Journal of Spacecraft and Rockets*, Vol. 37, No. 4, 2000, pp. 481-490
and Jilla, C. D., and Miller, D. W., “A Multiobjective, Multidisciplinary Design Optimization Methodology for Distributed Satellite Systems,” *Journal of Spacecraft and Rockets*, January 2004.