

Acknowledgments

Mr. Frank Spurlock (first author) is deceased, passing away only 2 months prior to this conference (AIAA 50th Joint Propulsion Conference), and only 3 weeks after completing the initial draft of this paper. Portions of this paper may appear to be written in one of two very different tones: sometimes humble and modest, while other times self-congratulatory to the point of boastful. The former is the product of the first author, the creator of DUKSUP, who had an overly modest and quiet persona. The latter is the product of the second author, someone who had worked for Frank for decades, believes in bestowing credit to those deserving, and felt Frank never got sufficient credit and recognition. That feeling is shared by many who worked for and with him (a few of whom contributed to the final review of this paper). NASA Lewis Research Center (now Glenn) senior management frequently acknowledged his accomplishments and his admirable character. His colleagues at General Dynamics greatly valued his technical skills and intellect. Frank also had many close friends and colleagues in the unmanned payload community, especially JPL. But until the mid-1980s with Shuttle/Centaur, the Centaur program was largely isolated within NASA, totally overshadowed by the manned program. Had Frank Spurlock been located at a Code M NASA Center performing comparable feats, he would have been front and center and a recipient of accolades from NASA Headquarters. He did receive many awards from LeRC, including NASA's prestigious Outstanding Leadership Medal (NASA's prestigious Outstanding Leadership Medal (for identifying, recruiting, and training young engineers); NASA's Certificate of Appreciation in recognition of outstanding contribution to the NASA Lewis Research Center College Relations Program with Howard University; numerous awards for supporting space missions beginning with Surveyor (first U.S. soft landing on the Moon) to Galileo (mission to Jupiter)). He began his career at LeRC in 1962 working in trajectory optimization and mission design for the Atlas/Centaur vehicle. Before retiring from the Center in 1997, he had done mission design and trajectory optimization for not only Atlas/Centaur, but also for Titan/Centaur, Shuttle/Centaur, and wide variety of other vehicles, many of which were never built. He managed a mission design and trajectory optimization section for the launch vehicle project at LeRC as well as managing mission design for specific missions. He supported the launch of the many vehicles that sent payloads to all of the planets (except Pluto), the Moon, and a wide variety of Earth orbits. His last position at LeRC was Deputy Division Chief for the Advanced Space Analysis Office, with primary responsibility for the analytic capabilities and activities of the group. Since retiring in 1997, Mr. Spurlock had consulted for government and commercial companies in the areas of mission design, trajectory optimization, space transportation architecture, and related disciplines. He had served on numerous review teams for launch vehicles, and most recently was a member of the team that considered the options for deflecting near-Earth objects that might impact Earth. Though not covered in this technical paper, Frank had another legacy—his positive impact on the lives of others. He mentored and helped propel the careers of many young engineers, within his group and beyond, and recruited workers from nontraditional sources. He also took a strong interest in the whole person, both at and outside the office, including their families. Frank was a superb role model and supporter of dreams and initiatives of others. Frank Spurlock was renowned at LeRC and within the broader unmanned space launch and spacecraft community for his exceptional technical skills, demonstrated accomplishments, and mentoring of staff. This paper is a modest attempt to secure for him the respect which was never widely bestowed on him—and which he never sought. Though DUKSUP brought him the initial recognition, it was only one of the lasting legacies of his career.

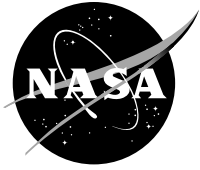
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DUKSUP: A Computer Program for High Thrust Launch Vehicle Trajectory Design and Optimization

*O. Frank Spurlock and Craig H. Williams
Glenn Research Center, Cleveland, Ohio*