Table of Contents

1

4
AIAA Statement on SpaceX Starship Test Flight (2023 November 18)

5
The Future of U.S. Robotic Planetary Exploration by Dr. Randii Wessen (2023 November 18)

15
Cover Page Description and Artwork Contributor

16
Cupid at SUNY Plattsburgh (by Dr. David H. Levy)

18
Young Professionals Happy Hour with the AIAA LA-LV Section (2023 November 14)

23
Navigating the Digital Frontier: Capitalizing on Digital Transformation in the Space Industry (2023 November 4)

29
The Fate Of Luna-25's Fregat Upper Stage (by Daniel R. Adamo) (2023 November 4)

37
NASA Administrator Honors Life of Apollo Astronaut Frank Borman (2023 November 9)
Table of Contents

2

38
AIAA Mourns the Passing of Ming Chang
(Written 2 October 2023)

39
Joshua Dobbs Highlighted
(Written 9 November 2023)

40
AIAA Foundation Day of Giving (28 November 2023)

41
AIAA and Club for the Future’s Resilient Student Scholarship

42
AIAA National 2023 Fall - Winter Course Catalog Released

47
Welcome! New AIAA Members!
(LA-LV Section)

48
Aerospace News Digest

49
Upcoming AIAA / LA-LV Events

55
From the First Launch in 2012 to New North Korea Satellite Malligyong-1 in Sun-Synchronous Orbit
(by Prof. Mike Gruntman)

58
AIAA LA-LV Aero Alumni Meeting
(2023 November 8)

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AIAA Statement on SpaceX Starship Test Flight

Written 18 November 2023


November 18, 2023 – Reston, Va. – The American Institute of Aeronautics and Astronautics (AIAA) issued the following statement from AIAA Executive Director Dan Dumbacher:

“Congratulations to the SpaceX team on today’s test flight of Starship from Starbase, Texas. It is exciting to witness a new launch vehicle achieving so many of its test objectives toward reaching orbit. The art and science of engineering requires testing and taking risks to understand the limits of systems and where designs should be improved. This test flight is a valuable learning experience, especially around the performance of its boosters. We look forward to seeing the team’s progress toward enhancing this new space launch capability and flying again.

With Starship, SpaceX is taking a step toward humans living and working off our planet. Flight tests, taking risks, and pushing new technologies that are still in development will lead to this future.

We are excited to see commercial space launch companies advancing technology in the cislunar ecosystem and pushing on to Mars. Expanding the boundaries leads to success.

AIAA recognizes the countless industry professionals who have helped design, build, and test Starship. We applaud AIAA Corporate Member SpaceX for taking this step forward in shaping the future of aerospace.”

About AIAA
The American Institute of Aeronautics and Astronautics (AIAA) is the world’s largest aerospace technical society. With nearly 30,000 individual members from 91 countries, and 100 corporate members, AIAA brings together industry, academia, and government to advance engineering and science in aviation, space, and defense. For more information, visit [www.aiaa.org](http://www.aiaa.org), or follow AIAA on [Twitter](http://twitter.com), [Facebook](http://facebook.com), or [LinkedIn](http://linkedin.com).

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(Nov. 18) The Future of U.S. Robotic Planetary Exploration by Dr. Randii Wessen
(Photos Only) [https://www.aiaa-lalv.org/blogs/2023-blogs/2023-november/2023-november-18]

Dr. Randii Wessen (left) chatted with some of the attendees, answering a question in a very dynamic and interactive way. The one in the middle is Mr. Angel Ramirez, the Vice Chair of the AIAA CSULB Student Branch.

Dr. Jeff Puschell (left), the moderator, introduced Prof. Paula Arvedson (middle) (CSULA, retired), with the latter giving greetings to the attendees, who celebrated her birthday in this month of November.
(Nov. 18) The Future of U.S. Robotic Planetary Exploration by Dr. Randii Wessen
(Photos Only)

Prof. Paula Arvdeson made the first cut of the cake prepared for her, with attendees cheering for her.
Dr. Jeff Puschell (AIAA Fellow, AIAA Region VI Education Director, and Mentor for the AIAA Los Angeles-Las Vegas Section) welcomed all and made the introduction for the event speaker, Dr. Randii Wessen.

Attendees gradually arrived and enjoyed the delightful birthday mood and atmosphere.
Dr. Randii Wessen began his presentation by explaining the birth and history of JPL, and the relationship among JPL, NASA, and CalTech.

(Left) JPL received the assignment to design, build, and operate the Explorer-1 satellite, the first by U.S. in 1958. (Right) Since then, JPL has been engaging with many missions to watch over Planet Earth.

(Left) Atmospheric CO₂ has been building up to high levels. (Right) Mars-Earth Comparisons and reasons to explore Mars.
MRO images revealed the black spots (lava tubes?) on the surface of Mars.

Attendees listened to the presentation with great attention and enthusiasm.

(Left) MAVEN (2014): "Where did Mars' Atmosphere go"? (Right) (For 2026+) Potential Mars Sample Return mission in discussion by JPL/NASA.
VERITAS has been delayed. It’s to study "Is Venus still active today?" Testing EELS (snake robot) on ice.

The proposed Europa Lander mission. Another way to explore Titan - APL’s Dragonfly (2027 launch, 2034 Saturn Arrival).

Exploring asteroids is another important mission for JPL. Lucy - Exploring 8 Jupiter Trojan (and 2 Main Belt) asteroids.
The dynamic and interactive styles of Dr. Randii Wessen were really optimal for in-person presentations and attendees.

(Left) Dr. Wessen tried to make sure he addressed a question properly. (left) X-ray light can help seeing the Orion Constellation in a new light.

(Nov. 18) The Future of U.S. Robotic Planetary Exploration by Dr. Randii Wessen
(Photos Only)

Studies of the exo-planets and searching for Earth-like planets (chart looks like an H-R diagram).

(Left) Many bizarre types of worlds have been revealed from exo-planets. (Right) The proposed Starshade for directly imaging exo-planets.

(Left) Goals: exploring our universe, understanding our planet, and improving our lives. (Right) Saturn rings.
(Nov. 18) The Future of U.S. Robotic Planetary Exploration by Dr. Randii Wessen

(Photos Only)

(Left) Dr. Wessen's motto from Tsiolkovsky. (Right) Dr. Jeff Psuchell moderated the Q&A session very professionally.

Dr. Jeff Psuchell presented the AIAA LA-LV Section appreciation certificate to Dr. Randii Wessen.

(Left) Dr. Puschell (left) and Mr. Okutsu (right) chatted about student education. (Right) Dr. Puschell explained AIAA education to parents.
Some parent attendees asked Dr. Puschell about education issues. Student attendees got advice from aerospace professionals.

Delicious and nice-looking cakes were ready. Attendees enjoyed the cakes and networking & conversations.

Folks were having fun and networking together. What a lovely, warm, and professional family of AIAA!
COVER:

Sunset; first Martian Expedition.
Lander design (LMCO).

art work by: James Vaughan
https://jamesvaughanphotoillus.com/
On the fourteenth of October 2023, I witnessed my 99th eclipse. This tally includes everything from barely noticeable penumbral eclipses of the Moon, where one can occasionally distinguish a slight shading of one side of the Moon as it wanders past the Earth’s outer shadow, to the dramatic and life-affirming total eclipses of the Sun.

The October eclipse was actually an annular eclipse or “ring” eclipse. The annular phase occurs during which the entire Moon covers the Sun, but because the Moon is near its apogee, or farthest point from the Earth in its orbit, then the Moon is surrounded by a ring of sunlight. I was all set to join the group heading to southern Texas to see the annular eclipse, but last month I was invited to be the keynote speaker at the Homecoming festival at the State University of New York at Plattsburgh. This invitation meant so much to me that I was not about to pass it up. So, I took a big chance, and it paid off.
The night of my lecture was clear and starry. I began the lecture with my own definition of what a university can be. The world is as it is; we can try but, in the end, it is difficult if not impossible to change it. A university, however, at its best represents the world as it can be. For me, this represents the ideal of what a university can accomplish. The case of SUNY Plattsburgh is a specific example of that possibility. The not-too-large student population, understandable relationships among students and faculty, careful and interesting course offerings, and even the Plattsburgh Cardinals sporting program, all help to promote this goal.

But this University offers one thing more. About 40 miles to the south, within the ancient Adirondack mountains, lies their rural campsite called Twin Valleys. As a youngster I attended the Adirondack Science Camp there in what were three of the happiest summers of my life. And for the past 20 years there has been the Adirondack Astronomy Retreat at this magnificent place.

On the eve of the eclipse my friend Ed Guenther and I led a small group of people to observe at our Adirondack Astronomy Retreat site, during which time I did a little comet hunting. The following morning the sky was cloudy but there were plenty of breaks in the clouds so we got a magnificent view of the partial eclipse. We were excited; the crowd was excited, and we thoroughly enjoyed the partial eclipse that lasted about two hours. During this excitement, the solar system continued its inexorable motions, as the Earth, the Moon, and the planets slowly wended their way through space and time.
(Nov. 14) Young Professionals Happy Hour with the AIAA LA-LV Section
(Photos Only) [https://www.aiaa-lalv.org/blogs/2023-blogs/2023-november/2023-november-14]

On November 14, the AIAA LA-LV Section had a fun and delightful Young Professional Happy Hour next to SpaceX in Hawthorne, CA.

This YP Happy Hour took place in a stylish Brewery, a very nice place for relaxation, gathering and networking.

(Left) Young and experienced professionals networked together. (Right) Attendees gradually arrived and checked in.
(Left) Attendees formed groups and enjoyed the conversations. (Right) It’s easy to engage in any groups of networking.

What a beautiful evening and setting!

(Left) More attendees arrived and joined the networking. (Right) The Brewery was nicely decorated.
(Nov. 14) Young Professionals Happy Hour with the AIAA LA-LV Section (Photos Only)

(Left) Attendees moved around and got to talk to many. (Right) An attendee talked to Mr. Luis Cuevas (right), our YP Chair.

(Left) Interesting conversations. (right: Mr. Ian Clavio, our Education Chair). (Right) Fun chatting. (left: Mr. Gary Moir. our Technical Chair.)

Great conversations and people got to know each other better in the cozy and warm setting and atmosphere.
(Nov. 14) Young Professionals Happy Hour with the AIAA LA-LV Section (Photos Only)

Happy faces and enthusiastic conversations were the best decorations of the evening.

Further conversations and keen conversations, in a beautiful evening.
(Nov. 14) Young Professionals Happy Hour with the AIAA LA-LV Section (Photos Only)

The settings were ideal for a great happy hour.

A good memory and lots of fun, and lighting!

What a great evening full of happy memories! See you next time!
Professionally prepared charts showed the amazing growth of digital transformation.

Mr. Dennis Leung began the presentation showing the important fast growth of the digital transformation.

(Left) Check-in table welcomes the attendees to sign-in. (Right) Attendees (in-person and on-line) got together to learn more.
Mr. Dennis Leung enthusiastically explained to the attendees in person and on-line about the key issues in digital transformation.

The in-person attendees listened carefully to the speaker, along with the on-line attendees.

(Left) The speaker sincerely shared his views on many aspects of digital transformation in aerospace. (right) Refreshments and coffee.
System Level Integrated Control is a very important part in aerospace that has been going through digital transformation.

Supply Chains in the aerospace industries also needs digitalization.

The speaker summarized the key aspects in aerospace digital transformation.
(Nov. 4) Navigating the Digital Frontier: Capitalizing on Digital Transformation in the Space Industry (Screenshots & Photos only)

Centralized Management System requires digital solutions to optimize operations.

"Cyber Resiliency" is a key in the digital transformation in aerospace.

Digital inputs and data integrity/compliance are crucial gateway to Cyber Resiliency.
Mr. Dennis Leung provided his analysis on what the aerospace industry needs to do about digital transformation.

Mr. Dennis Leung patiently detailed his views and recommendations for the key challenges in digital transformation.

(Left) Attendees asked very interesting questions. (Right) The speakers went into more details for the answers.
(Nov. 4) Navigating the Digital Frontier: Capitalizing on Digital Transformation in the Space Industry  (Screenshots & Photos only)

More questions and answers between the attendees (in-person and on-line) and the speaker.

Attendees continued to stay after the presentation for more conversations and networking.

Smiles and happy faces could be seen on all's faces during networking. It was truly fun and insightful/inspiring.
Launched 10 August 2023 from Vostochny Cosmodrome at 23:11 UTC by a Soyuz-2.1b rocket, Russia's Luna-25 lunar lander entered orbit about the Moon five days later. Subsequently, a planned 84-s maneuver extended to 127 s, and the lander crashed onto the Moon 19 August at 11:57 UTC.¹ On 24 August, the Lunar Reconnaissance Orbiter imaged a new crater (see Figure 1) thought to be from Luna-25's impact.²

![Figure 1](image-url)

**Figure 1.** The white arrow points to a new lunar crater 10 m across and likely formed by Luna-25's unintended impact (credit: NASA-GSFC/Arizona State University).

But what fate befell Luna-25's Soyuz-2.1b Fregat upper stage after it set the ill-fated spacecraft on a trans-lunar trajectory and was jettisoned? Disposal strategies for translunar upper stages are often questionable, a recent example being China's Chang'e 5-T1 third stage. This object, initially known as WE0913A, impacted the Moon's farside after multiple chaotic lunar encounters and nearly 2689 days in space.³

Fregat trajectory data presented here are based on the "s2" JPL-*Horizons* ephemeris for this upper stage. Posted 24 October 2023, s2 reflects 45 observations made from 5.5 to 21.5 October 2023 UTC. The s2 trajectory has been replicated by modeling Earth, Sun, and Moon gravity along with solar radiation pressure (SRP) acceleration in the WeavEncke trajectory predictor.⁴

---


The Fate Of Luna-25's Fregat Upper Stage

The SRP model is calibrated such that coasts from an s2 state on 12 August 2023 reproduce terminal conditions inferred from s2 on 26 February 2024. On that date, Fregat is predicted to undergo incineration in Earth's atmosphere over the Pacific Ocean. Entry interface (EI) circumstances at a geodetic altitude of +121.92 km appear in Table 1 for an extrapolated s2 trajectory along with the SRP-calibrated WeavEncke coast. Terminal ground tracks for these two predictions appear in Figure 2.

Table 1. Circumstances at EI (including UTC on 26 February 2024, geodetic latitude \(\phi\), longitude \(\lambda\), inertial speed \(v\), inertial flight path angle \(\gamma\), and perigee height above Earth's equatorial radius \(H_P\)) are provided in association with extrapolated JPL s2 terminal conditions and a coast from s2 conditions six months earlier using a calibrated SRP model.

<table>
<thead>
<tr>
<th>Trajectory</th>
<th>UTC</th>
<th>(\phi)</th>
<th>(\lambda)</th>
<th>(v) (km/s)</th>
<th>(\gamma)</th>
<th>(H_P) (km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>s2 Extrapolated</td>
<td>18:41:36</td>
<td>11.6° S</td>
<td>168.9° W</td>
<td>10.995</td>
<td>-21.341°</td>
<td>-750.8</td>
</tr>
<tr>
<td>s2 WeavEncke Coast</td>
<td>18:28:25</td>
<td>11.7° S</td>
<td>165.6° W</td>
<td>10.996</td>
<td>-21.340°</td>
<td>-750.6</td>
</tr>
</tbody>
</table>

Figure 2. Terminal ground tracks for the s2 Extrapolated (yellow) and s2 WeavEncke Coast (cyan) trajectories from Table 1 are plotted beginning west of the Hawaiian Islands about six hours before atmospheric entry. Maltese crosses (✠) mark predicted positions for each trajectory on 26 February 2024 at 18:28:30 UTC. Circles centered on the crosses mark the corresponding horizons at this UTC. A contemporaneous sunrise terminator is denoted by the change in shading running northeastward from east of Australia.
Figure 3 plots geocentric Fregat motion from the s2 WeavEncke coast in a coordinate system rotating to track the Sun as Earth revolves around it. Lunar motion during the coast interval is co-plotted as a supplemental indication of the Moon's influence on s2.

Figure 3. Geocentric motion of Fregat (blue) and the Moon (red) is plotted in a rotating coordinate system such that the Sun is always to the left as annotated. Daily time ticks at 00:00 UTC appear as "+" markers extending from 11 August 2023 to 26 February 2024 UTC. Perspective is 5° from the ecliptic plane's north pole and very nearly perpendicular to the Fregat orbit plane. This viewpoint reveals Fregat distance from the ecliptic plane as dotted projection lines. Because the Moon orbits Earth nearly in the ecliptic, its projections are seen end-on and are not visible. Fregat annotations provide the UTC decimal date of translunar apogee in years 2023 and 2024. Preceding this date is the s2 orbit count (Orb), a tally of ascending node passages on Earth's equator commencing with Orb = 1 at launch.

Tight turns and kinks near the Moon's orbit in Figure 3's Fregat plot are indications of close lunar encounters. Table 2 provides s2 WeavEncke coast data pertaining to each of these events.
Table 2. Circumstances at pericynthion during Fregat's close lunar encounters are summarized. Pericynthion height above the Moon's mean surface radius is $H_P$ and $i$ is Fregat's inclination with respect to the lunar equator.

<table>
<thead>
<tr>
<th>Orb</th>
<th>UTC</th>
<th>$H_P$</th>
<th>$i$</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>16 Aug 2023 @ 08:19:23</td>
<td>35394</td>
<td>158.9°</td>
</tr>
<tr>
<td>4</td>
<td>12 Sep 2023 @ 13:58:11</td>
<td>14865</td>
<td>70.7°</td>
</tr>
<tr>
<td>9</td>
<td>06 Nov 2023 @ 01:23:19</td>
<td>34722</td>
<td>86.5°</td>
</tr>
<tr>
<td>16</td>
<td>22 Feb 2024 @ 13:27:06</td>
<td>8520</td>
<td>122.6°</td>
</tr>
</tbody>
</table>

The Orb = 16 closest lunar encounter is plotted in Figure 4.

Figure 4. Fregat selenocentric inertial motion is plotted during its closest lunar encounter on Orb = 16. Perspective is very nearly perpendicular to Fregat's trajectory plane. Hourly time ticks ("+") markers are annotated with UTC in DOY/hh:mm format where DOY = 053 is equivalent to 22 February. Dotted lines are projections onto the ecliptic plane. The area shaded gray is the Moon's nightside.

If the Luna-25 mission had a responsible Fregat disposal strategy, it appears to have failed. Suppose Fregat navigation, onboard power, and residual propellant after Luna-25 separation had
permitted a course correction to the s2 trajectory on 11 August at 06:00 UTC (6.8 hours after launch), leading to disposal in solar orbit following a lunar gravity assist. What would be a change-in-velocity magnitude \( \Delta v \) necessary to fulfill such a strategy, and how would the resulting trajectory appear? With \( \Delta v = 59.6 \) m/s, Fregat's as-flown trajectory encountering the Moon's leading hemisphere in geocentric orbit can be diverted to a trailing hemisphere encounter with \( H_P = +658.0 \) km. Figure 5 illustrates how this disposal \( \Delta v \) transforms post-encounter motion towards Earth into escape from Earth to orbit the Sun. Note the relatively high speed of the post-encounter escape trajectory as inferred from spacing between successive time ticks.

Figure 5. Geocentric inertial motion of the s2 as-flown Fregat trajectory (blue), a diverted hypothetical Fregat trajectory targeting disposal in solar orbit (green), and the Moon (red) is plotted in the days following Luna-25 launch. Perspective is very nearly perpendicular to the as-flown Fregat orbit plane. Daily time ticks ("+") markers at 00:00 UTC are annotated with the date in YYYY-MM-DD format. Dotted lines are projections onto the ecliptic plane. The area shaded gray is Earth's nightside.

A WeavEncke coast with the same acceleration modeling as that producing the Figure 3 prediction is then used to extrapolate Fregat's hypothetical disposal trajectory two years into the future. The result is illustrated in Figure 6. This plot indicates the disposed Fregat will fall an additional 6.5 million km farther behind Earth during each year it orbits the Sun. Assuming this rate and an Earth orbit of 150 million km radius, it would require 145 years for the disposed Fregat to phase completely around Earth's orbit and reach our planet's vicinity once again.
Figure 6. Earth-relative motion of the hypothetical Fregat disposal trajectory (green) is plotted for two years following launch. Positions to the right of Earth lead it in solar orbit, and positions to the left of Earth trail it. The horizontal axis passing through Earth is a heliocentric circle. Consequently, the downward direction at any point in this plot is toward the Sun. Time ticks ("+") markers at 30-day intervals are annotated with the date at 00:00 UTC in YYYY-MM-DD format.

Because Fregat coasts are the first use of WeavEncke to simulate SRP accelerations, this model's formulation is provided here for reference, along with its calibration in the Fregat application. The model is roughly attributable to Vallado\textsuperscript{5} with embellishments accounting for solar eclipses and arbitrary distance from the Sun. Defining

\[
\begin{align*}
  r &\equiv \text{the Sun's apparent position centered on Fregat in AU}, \\
  c &\equiv \text{the speed of light in km/s}, \\
  f &\equiv \text{the Sun's unobscured fraction as observed from Fregat (non-dimensional)}, \\
  F &\equiv \text{solar flux incident on Fregat in W/m}^2 \text{ or kg/s}^3, \\
  q &\equiv \text{solar radiation pressure in kg/(s}^2\text{-km}), \\
  A &\equiv \text{Fregat area exposed to solar flux} = 6.92e-6 \text{ km}^2, \\
  m &\equiv \text{Fregat mass} = 1050 \text{ kg}, \\
  \rho &\equiv \text{unlimited empirical "reflectivity" factor (non-dimensional), and} \\
  a &\equiv \text{Fregat solar radiation pressure acceleration in km/s}^2
\end{align*}
\]

the following pertinent relationships arise.

\[
F = \frac{1353f}{r^2} \\
q = \frac{F}{c} \\
\alpha = -\frac{qA\rho}{mr} r
\]

Although \( f = 1.0 \) through most of the s2 coast, there are brief trajectory arcs within Earth's shadow as illustrated in Figure 7. No entries into the Moon's shadow occur during s2.

**Figure 7.** Fregat geocentric inertial motion turns from blue to black during solar eclipse intervals in Earth's shadow. Perspective is very nearly perpendicular to the Orb 2 plane. "Orb" annotations associated with eclipses are consistent with those in Figure 3. Time ticks ("+" markers) at 5-minute intervals are annotated with UTC in DOY/hh:mm format. Dotted lines are projections onto Earth's equatorial plane. The area shaded gray is Earth's nightside on DOY = 223 or 11 August in 2023.
The Fate Of Luna-25's Fregat Upper Stage

Fregat eclipse timing is summarized in Table 3.

Table 3. Fregat solar eclipses in Earth's shadow illustrated by Figure 7 are decomposed into partial phases with $0.0 < f < 1.0$ and total phases with $f = 0.0$.

<table>
<thead>
<tr>
<th>Orb</th>
<th>UTC</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>11 Aug @ 00:31:19</td>
<td>$f = 0.0$ interval ends</td>
</tr>
<tr>
<td>2</td>
<td>11 Aug @ 00:31:25</td>
<td>$f &lt; 1.0$ interval ends</td>
</tr>
<tr>
<td>2</td>
<td>22 Aug @ 01:26:11</td>
<td>$f = 1.0$ interval ends</td>
</tr>
<tr>
<td>2</td>
<td>22 Aug @ 01:26:22</td>
<td>$f = 0.0$ interval begins</td>
</tr>
<tr>
<td>3</td>
<td>22 Aug @ 01:51:49</td>
<td>$f = 0.0$ interval ends</td>
</tr>
<tr>
<td>3</td>
<td>22 Aug @ 01:52:02</td>
<td>$f &lt; 1.0$ interval ends</td>
</tr>
<tr>
<td>3</td>
<td>04 Sep @ 00:55:16</td>
<td>$f = 1.0$ interval ends</td>
</tr>
<tr>
<td>3</td>
<td>04 Sep @ 00:55:29</td>
<td>$f = 0.0$ interval begins</td>
</tr>
<tr>
<td>4</td>
<td>04 Sep @ 01:20:39</td>
<td>$f = 0.0$ interval ends</td>
</tr>
<tr>
<td>4</td>
<td>04 Sep @ 01:20:55</td>
<td>$f &lt; 1.0$ interval ends</td>
</tr>
</tbody>
</table>

Per Table 1, the extrapolated s2 trajectory has $H_P = -750.8$ km on Orbit 16. This becomes the target to be achieved in calibrating the SRP model with $\rho$ iterations in WeavEncke coasts. Results from these iterations are illustrated in Figure 8. Note the WeavEncke coast misses Earth's atmosphere entirely on Orb 16 without SRP modeling ($\rho = 0$), while the s2 $H_P$ is reproduced to sub-km precision (reference Table 1) with $\rho = 4.061$.

Figure 8. Variations in Orb 16 $H_P$ with $\rho$ are plotted as the WeavEncke coast SRP model is calibrated.
NASA Administrator Honors Life of Apollo Astronaut Frank Borman

(November 9, 2023) [https://www.nasa.gov/news-release/nasa-administrator-honors-life-of-apollo-astronaut-frank-borman/]

The following is a statement from NASA Administrator Bill Nelson on the passing of former NASA astronaut Col. (ret.) Frank Borman, who passed away Nov. 7, in Billings, Montana, at the age of 95.

“Today we remember one of NASA’s best. Astronaut Frank Borman was a true American hero. Among his many accomplishments, he served as the commander of the Apollo 8 mission, humanity’s first mission around the Moon in 1968.

“His lifelong love for aviation and exploration was only surpassed by his love for his wife Susan.

“Frank began his career as an officer with the U.S. Air Force. His love of flying proved essential through his positions as a fighter pilot, operational pilot, test pilot, and assistant professor. His exceptional experience and expertise led him to be chosen by NASA to join the second group of astronauts.

“In addition to his critical role as commander of the Apollo 8 mission, he is a veteran of Gemini 7, spending 14 days in low-Earth orbit and conducting the first rendezvous in space, coming within a few feet of the Gemini 6 spacecraft.

“Frank continued his passion for aviation after his time with NASA as the CEO of Eastern Airlines.

“Frank knew the power exploration held in uniting humanity when he said, ‘Exploration is really the essence of the human spirit.’ His service to NASA and our nation will undoubtedly fuel the Artemis Generation to reach new cosmic shores.”

For more about Borman’s NASA career, photos, and his agency biography, visit:

[https://www.nasa.gov/former-astronaut-frank-borman/]
AIAA Mourns the Passing of Ming Chang


It is with a very heavy heart that we share Ming Chang, AIAA Aeronautics Domain Lead and AIAA Associate Fellow, passed away Sunday, 1 October 2023. Ming was a pioneer throughout his career in aeronautical engineering. Ming’s leadership driving AIAA to address the important challenges of the aeronautical world will be long remembered. His AIAA service is directly responsible for the Institute’s aeronautics domain leadership. Everyone at AIAA extends our deepest condolences to Ming’s family through this difficult time.

(Editor's note: Mr. Ming Chang spoke to the AIAA Los Angeles-Las Vegas Section on the AIAA Domain Initiative in 2022, and attended several of the Section meetings/events in the past 2 years. He registered / RSVPed the AIAA LA-LV Section Town Hall Meeting (October 7) on the Venus Lander proposal, but didn't attend.)
Joshua Dobbs Highlighted  
(Written 9 November 2023)  

Josh Dobbs participates at AIAA Design/Build/Fly Competition. | Credit: AIAA–©

The Star Tribune spotlights Joshua Dobbs, the Vikings new quarterback, who majored in aerospace engineering at the University of Tennessee and was involved with AIAA’s Design/Build/Fly competition.

Full Story (The Star Tribune)

Video
Josh Dobbs receives congratulations from coaches and teammates following his comeback win, days after being traded to the Minnesota Vikings
(Bleacher Report; [YouTube](https://www.youtube.com/watch?v=OE4FYlrjJgs))

https://www.youtube.com/watch?v=OE4FYlrjJgs
The AIAA Foundation inspires and supports the next generation of aerospace professionals. From classroom to career, the AIAA Foundation enables innovative K-12 and university programming, including STEM classroom grants, scholarships, conferences, and hands-on competitions.

The Foundation has established a path toward reaching our goal of impacting one million students per year. Through new partnerships and our current programs AIAA expects to impact 1 million students by 2025. Some of these initiatives include:

- **Students To Launch**: Engaging middle school students from underrepresented communities in the challenges and inspiration of spaceflight with NASA mission-inspired activities and the opportunity to witness a space launch. Impacting over 20,000 middle school students and educators since piloting this NEW program in 2022.
- **Exploration Generation (ExGen) Program**: Providing hands-on rocketry curricula for elementary and middle school educators, developed with the National Science Teaching Association (NSTA) and Estes Rockets, impacting more than 500,000 K-12 students.
- Awarded $75,000 to K-12 educators as grants and awards impacting more than 25,000.
- Partnered with Blue Origin and Challenger Center to award three Trailblazing STEM Educators impacting 2,500 K-12 students annually.
- Supporting university design competitions, like our largest AIAA Design/Build/Fly, involving more than 2,000 university students annually.
- Providing over $100,000 to undergraduate and graduate students to help fund their education annually.

Our donors are the heartbeat of the AIAA Foundation—we couldn’t do what we do without you.
AIAA and Club for the Future’s Resilient Student Scholarship

AIAA and Club for the Future’s Resilient Student Scholarship was created in 2023 with a profound commitment to promote diversity, equity, and inclusion in the aerospace industry. This scholarship is specifically designed to empower and inspire students who have faced unique challenges: students with disabilities; from underrepresented racial and ethnic backgrounds, gender minorities, or disadvantaged socioeconomic circumstances; and first-generation college students.

Made possible by a collaboration with Club for the Future whose mission is to inspire future generations to pursue careers in STEM and to help invent the future of life in space. One $10,000 scholarship will be awarded to a graduating high school senior who is enrolling in a STEM program at a college, university, or 2-year technical institution. The winner will also receive a mentor from AIAA’s professional members to help guide the student to achieve a career in aerospace.

Applications for the AIAA and Club for the Future’s Resilient Student Scholarship open 7 November 2023 and close on 31 January 2024 at 2359 hrs ET. For questions, email K-12STEM@aiaa.org.

Apply Today!

- Eligibility Requirements
  - Currently enrolled high school senior intending to pursue a STEM degree at a college, university, or technical institution.
  - Must be attending a U.S. institution in the fall
  - Should demonstrate financial need

- Application Documents
  - Transcript or most recent report card showing your G.P.A. out of a 4.0 scale
  - Brief description of your interest and experience with STEM subjects and a short (500 word) personal essay.
  - Letter of recommendation from teachers, counselors, or professional references.

AIAA Announces $10,000 Scholarship in Partnership with Blue Origin’s Club for the Future

(Nov. 16, 2023)

AIAA National 2023 Fall - Winter Course Catalog Released

Build Skills with Online Courses

The Institute is offering 16 online short courses this fall to help you stay sharp and improve your knowledge base. These courses are taught by renowned industry leaders and experts. Special pricing is available for AIAA members and student members, as well as group discounts for five or more individuals from the same organization. Enroll in an upcoming course.

BROWSE CATALOG

UPCOMING COURSES

Aircraft and Rotorcraft System Identification Engineering Methods for Piloted and UAV Applications with CIFER® - Online Course (Dec 4 – 7, 2023) View Details | Buy Now

Aircraft Maintenance Management – Online Short Course (Starts January 16, 2024) View Details | Buy Now

Mission-based Vehicle Design: Digital Mission Engineering for Advanced Air Mobility (Online Short Course – Starts Jan 29, 2024) View Details | Buy Now

Cryogenic Fluid Management for Storage & Transfer of Liquid Propellants in Space – Online Short Course (Starts Jan 30, 2024) View Details | Buy Now
AIAA National 2023 Fall - Winter Course Catalog Released

- Vibration of Periodic Structures – Online Short Course (Starts Feb 6, 2024)
  View Details | Buy Now

- Fundamentals of Aeroelasticity: From Basics to Application – Online Short Course (Starts February 13, 2024)
  View Details | Buy Now

- Principles of Success in Spaceflight from Andrew Chaikin – Online Short Course (February 21-22, 2024)

- Design of Space Launch Vehicles – Online Short Course (Starts February 26, 2024)

- Financial and Business Acumen for Navigating the Aerospace Industry – Online Short Course (Starts March 5, 2024)

- Turbomachinery for Emerging Space Applications: Liquid Rocket Propulsion – Online Short Course (Starts March 11, 2024)

- Aircraft Reliability & Reliability Centered Maintenance – Online Short Course (Starts March 19, 2024)

- Design Evolution of Aircraft Structures – Online Course (Starts March 19, 2024)

- Test Foundations for Flight Test – Online Short Course (Starts April 8, 2024)

- Human Spaceflight Operations: Lessons Learned from 60 Years in Space – Online Short Course (Starts May 7, 2024)
AIAA National 2023 Fall - Winter Course Catalog Released

Guidance and Control of Hypersonic Vehicles – Online Short Course (Starts May 14, 2024)

Spacecraft Lithium-Ion Battery Power Systems – Online Short Course (Starts May 21, 2024)

Safety Management System (SMS) in Aviation – Online Short Course (Sept 10 – 13, 2024)

Understanding Aircraft Noise: From Fundamentals to Design Impacts and Simulations – On-Demand Short Course

Design of Experiments: Improved Experimental Methods in Aerospace Testing – On-Demand Short Course

Launch Vehicle Coupled Loads Analysis: Theory and Approaches – On-Demand Short Course

Design of Space Launch Vehicles – On-Demand Short Course

Space Architecture: Designing a Lunar Habitation System – On-Demand Short Course

Hypersonic Flight Vehicle Design and Performance Analysis – On-Demand Short Course

Hypersonics: Test and Evaluation – On-Demand Short Course

Hypersonic Applications: Physical Models for Interdisciplinary Simulation – On-Demand Short Course

Hypersonic Propulsion Concepts: Design, Control, Operation, and Testing – On-Demand Short Course
AIAA National 2023 Fall - Winter Course Catalog Released

- Fundamentals of Space Systems - On-Demand Short Course
- Advanced Space Propulsion - On-Demand Short Course
- Fundamentals of Thermal Vacuum Testing Science - On-Demand Short Course
- Applications of Thermal Vacuum Testing - On-Demand Short Course

- Introduction to Propellant Gauging - On-Demand Short Course
- Satellite and SmallSat Thermal Control Engineering - On-Demand Short Course
- Fundamentals of Space Vehicle Guidance, Control, and Astrodynamics - On-Demand Short Course
- Designing Better CubeSats Using System-Level Simulations - On-Demand Short Course

- Fundamentals of Classical Astrodynamics and Applications - On-Demand Short Course
- Spacecraft Design, Development, and Operations - On-Demand Short Course
- Fundamentals of Airplane Performance, Stability, Dynamics and Control - On-Demand Short Course
Welcome ! New AIAA Members! (LA-LV Section)

Connor McGinley
Amy Sharma
Semen Mekhanoshin
Aiden Rowe
Alex Jedinger
Mr Jose R Martinez
Shelby Griffin
Andy Sadhwani
Mr Clisbert Hurtado-Hernandez
Mr Justin Kerr
Samuel Murillo
Ryan S Heiling
Mr Aaron Ma
Madeline Davies
Sara Guerrero Velandia
Cameron Coen
Diego Cea
Glen Chung
Daniel Fairfax
Winnie Lai

Welcome, new members and Congratulations!
<table>
<thead>
<tr>
<th>Date</th>
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</tr>
</thead>
<tbody>
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Upcoming AIAA / LA-LV Events

RSVP and Information: [https://conta.cc/3StkIKA](https://conta.cc/3StkIKA)

AIAA LA-LV 12/7 Section Technical Meeting (Hybrid)
Thursday, December 7, 2023, 5:30 PM PST (GMT -0800) (US and Canada)

The Aircraft Designers:
A Northrop Grumman Historical Perspective with Michael Ciminiera

Presenter:
Mr. Michael Ciminiera
Northrop Grumman Vice President, Retired
AIAA Associate Fellow | AIAA Member Emeritus
(The speaker will present in person.)

Disclaim: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles-Las Vegas Section.

Contact: Mr. Gary Moir (Technical Chair) gary.moir@ingenuir.com; General Contact: contact@aiaa-lalv.org

Physical Location
Palos Verdes Peninsula Center Library
(Community Room, 3rd Floor, next to the main library area)
701 Silver Spur Road
Rolling Hills Estates, CA 90274
(South of 405 Hwy / PCH 1 Hwy, West of 110 Hwy, and North/East of the Pacific Ocean)
(In between Hawthorne Blvd. and Crenshaw Blvd., on Silver Spur Road)
(also on-line for a hybrid event)
(This event is not sponsored by the Palos Verdes Peninsula Center Library)

Online on Zoom
(Tentative Agenda: (All Time PST (GMT -0800, US and Canada))
05:30 pm: Door Open, Check-in, Networking, and Dinner (See options in RSVP/Registration, or bring your own) (The Admission itself is Free of Charge.)
06:30 pm: Presentation, Q&A
08:00 pm: Adjourn, Networking. Wrapping up (2nd FL Parking closes)
09:00 pm: Library Building closes

Please register /RSVP and you will receive the ticket with the Zoom link. Please check Spam or Junk folder shortly after registration to make sure. If not, please try using an alternative email address.

Disclaimer: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles-Las Vegas Section.

Contact: Mr. Gary Moir (Technical Chair) gary.moir@ingenuir.com; General Contact: contact@aiaa-lalv.org

aiaa-lalv.org | aiaa-lasvegas.org
engage.aiaa.org/losangeles-lasvegas
RSVP and Information: [https://conta.cc/3Mxjmuw](https://conta.cc/3Mxjmuw)

AIAA LA-LV 12/9 Section Town Hall (Hybrid) Meeting

Saturday, December 9, **11 PM PST** (US and Canada) (GMT -0800)

(With in-person and on-line attendance and speakers.)

Commercialization of Space Biomedicine:

How SpaceBox Accelerates Drug Screening in Microgravity

(Presented also in the AIAA ASCEND 2023 in Las Vegas, NV)

**Alina Voronina**
Chief Business Development Officer at SpaceBox Scientific
(This speaker will present in person.)

**Yaroslav Zaplatnikov**
Founder and CEO of SpaceBox Scientific
(This speaker will present remotely on-line.)

Cosmic Sunscreen –
Modulating the DNA Repair Response to Shield Astronauts from Cancer

**Dr. Devon Lundine**
Post-doctoral research fellow at Memorial Sloan Kettering Cancer Center
(This speaker will present remotely on-line.)

Physical Location
Artesia Library (in the Meeting room)
18801 Elaine Avenue, Artesia, CA 90701

(Tentative Agenda: (All Time PST (GMT -0800))
10:30 am: 11:00 am: Check-in, Networking
11:00 am: 11:05 am: Welcome and Introduction
11:05 am: 12:35 pm: Presentations, Q&A, Displays
12:35 pm: Networking, Adjourn
02:00 pm: Leave Meeting Room by 2 pm

Disclaimer: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles-Las Vegas Section.

Contact: General Contact: contact@aiaa-lalv.org, Events/Program events.aiaalalv@gmail.com

aiaa-lalv.org | aiaa-lasvegas.org
engage.aiaa.org/losangeles-lasvegas
RSVP and Information: (https://conta.cc/49ojl5X)

AIAA LA-LV 12/12 Section (On-line) Meeting

Tuesday, December 12, 2023, 5 PM PST (US and Canada) (GMT -0800)

(An on-line meeting)

SPACEPOWER-Star Shield, Proven & Patented Peacemaker for Peace On Earth & Above!

Mr. Shawn P. Boike
CEO & President of AIC & Insta-Grid
United States Space Force via AIC & Insta-Grid, Los Angeles, CA

(This speaker will present on-line remotely.)

Professor David C. Hyland, Sc.D.
Professor of Aerospace Engineering, College of Engineering Adjunct Professor of Physics, College of Science Wisenbaker Chair of Engineering
Director of Space Science and Space Engineering Research, Texas A&M University (Emeritus)
President, Augusta Quantum Electrodynamics Inc

(This speaker will present on-line remotely.)

Online on Zoom
(Please register /RSVP and you will receive the ticket with the Zoom link. Please check Spam or Junk folder shortly after registration to make sure. If not, please try using an alternative email address.)

Tentative Agenda: (All Time PST (GMT -0800)) (US and Canada)
5 pm: Presentation and Q&A
7 pm: Adjourn.

Disclaimer: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles-Las Vegas Section.

Contact: General Contact: contact@aiaa-lalv.org, Events/Program events.aiaaalalv@gmail.com

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AIAA LA-LV 12/13 Section Aero Alumni (Hybrid) Meeting

Wednesday, December 13, **11 AM - 1 PM PST** (GMT -0800) (US and Canada)

**Aero Alumni Meeting**

*Zoom on-line meeting and in-person as well.*

Our monthly Aero Alumni Zoom meeting is at 11 am PST (on-line and in-person) on December 13 (The 2nd Wednesday of December). It will be a hybrid meeting. "Aero Alumni" are retirees from aerospace industries. All public are welcome to attend. Open to public with free admission. Please Contact [Mr. Gary Moir](mailto:gary.moir@ingenuir.com) for your attendance, on-line or in-person.

**In-Person in:**
*A C Bilbrew Library
150 E. El Segundo Blvd, Los Angeles, CA 90061*

(This meeting is not sponsored by the A C Bilbrew Library Library)

(South of Hwy 105, East of Hwy 110, North of Hwy 91, and West of Hwy 710)

No lunch will be provided by the AIAA LA-LV Section.

**Online on Zoom:**

Join Zoom Meeting: [https://aiaa.zoom.us/j/83901842953?pwd=ZDVlN0NyZ3h1QmV3Q0ZvODZ0d1ZGZz09](https://aiaa.zoom.us/j/83901842953?pwd=ZDVlN0NyZ3h1QmV3Q0ZvODZ0d1ZGZz09)

**Meeting ID: 839 0184 2953**

One tap mobile [+16694449171,,83901842953# US, +13462487799,,83901842953# US (Houston)]

**Passcode: 687375**

Dial by your location
+1 669 444 9171 US
+1 346 248 7799 US (Houston)
+1 719 359 4580 US
+1 720 707 2699 US (Denver)
+1 253 205 0468 US
+1 253 215 8782 US (Tacoma)
+1 507 473 4847 US
+1 564 217 2000 US

Meeting ID: 839 0184 2953

Find your local number: [https://aiaa.zoom.us/u/kygelM7k3](https://aiaa.zoom.us/u/kygelM7k3)

Please contact Mr. Gary Moir ([gary.moir@ingenuir.com](mailto:gary.moir@ingenuir.com))
AIAA LA-LV 12/16 Section Town Hall (Hybrid) Meeting

Saturday, December 16, 2023, 11 AM PST  (US and Canada) (GMT -0800)

(with in-person and on-line attendance.)

Safe Is Not An Option:
Overcoming The Futile Obsession With Getting Everyone Back Alive That
Is Killing Our Expansion Into Space

Rand Simberg, MSE
Consultant in Aerospace Industries
Adjunct Scholar at Competitive Enterprise Institute,
Book Author,
Freelancer at Popular Mechanics, and
President at Interglobal Space Lines.
Formerly in engineering and management at the Aerospace Corporation in El Segundo, CA
Former project manager with Rockwell International Rockwell International in Downey, CA

(The speaker will present in person.)

Physical Location
Lawndale Library (Meeting Room)
14615 Burin Ave., Lawndale, CA 90260
(South of 105 Hwy, East/North of 405 Hwy, East of Pacific Coast Hwy (1))
(Near SpaceX Hawthorne, and close to Northrop Grumman Space Park)
(also online on Zoom for a hybrid event)
(This event is not sponsored by the Lawndale Library)

Online on Zoom
(Please register /RSVP and you will receive the ticket with the Zoom link.
Please check Spam or Junk folder shortly after registration to make sure.
If not, please try using an alternative email address.)

Disclaimer: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles-Las Vegas Section.
Contact: General Contact: contact@aiaa-lalv.org, Events/Program events.aiaala@gmail.com
RSVP and Information: [https://conta.cc/3tX2WoX](https://conta.cc/3tX2WoX)

AIAA LA-LV 1/27 Section Meeting

Saturday, January 27, 2024, 11 AM PST (Check-in) / 1 PM PST (Talk)

In the Line of Duty:
Michael Adams and the X-15

by

Ms. Michelle Evans
AIAA Distinguished Speaker
Writer, Photographer, and Communications Specialist in aerospace
(The speaker will present in person.)

Location
Norwalk Regional Library, in the Meeting Room
12350 Imperial Hwy
Norwalk, CA 90650

Google Maps: [https://maps.app.goo.gl/41e8HsfPZd7Eav56](https://maps.app.goo.gl/41e8HsfPZd7Eav56)
(This event is not sponsored by the Norwalk Library)

(Tentative Agenda: (All Time PST (GMT -0800)) (US / Canada)
11:00 am: Check-in, Networking.
11:30 am: Documentary film "Research Project X-15" (25m)
12:00 pm  Lunch for those who bring own’s lunch.
Networking. Book-signing
12:55 pm: Welcome and Introduction
01:00 pm: Presentations and Q&A
02:30 pm: Documentary film "The Rocket Pilots" (75 min), commentary/further Q&A
04:00 pm: Adjourn. Networking.
05:00 pm: Leave meeting room by 5 pm.

Disclaimer: The views of the speakers do not represent the views of AIAA or the AIAA Los Angeles-Las Vegas Section.
Contact: General Contact: contact@aiaa-lalv.org, Events/Program events.aiaalalv@gmail.com
From the First Launch in 2012 to New North Korea Satellite Malligyong-1 in Sun-Synchronous Orbit by Prof. Mike Gruntman, Professor of Astronautics at USC (2023 November 25)

On November 21, 2023, the Democratic People’s Republic of Korea (DPRK) (North Korea) successfully launched a satellite into orbit.

Space Track gave the following two-line elements (TLE, or el-set) of satellite Malligyong-1 on November 24:

1 58400U 23179A   23328.57554803  .00009201  00000-0  41491-3 0  9998

2 58400  97.4277 213.3168 0014283 269.1795  90.7804 15.21156641   455

The satellite orbit has the following parameters:

- inclination 97.4277 deg
- eccentricity 0.0014283
- orbit apogee 512.2 km
- orbit perigee 492.5 km
- orbital period 5680 sec = 94.66 min

Credit: DPRK TV
From the First Launch in 2012 to New North Korea Satellite Malligyong-1 in Sun-Synchronous Orbit

In December 2012, North Korea launched its first satellite KwangMyongSong 3 (KMS-3-2) on the Unha-3 rocket. I then put a video on YouTube analyzing the launch and orbital properties of the satellite. The pdf of the slides of that analysis, with all the equations, can be downloaded from https://astronauticsnow.com/2012northkorea/ or directly here.

Repeating the analysis, the new North Korean satellite Malligyong-1 is deployed in a near-circular sun-synchronous orbit, with a daily orbit precession of 0.9879 deg/day. The satellite completes approximately 15 orbits each day. The altitude of the orbit perigee is almost exactly the same as that of KMS-3-2.

To summarize, North Korea deployed its new satellite into a sun-synchronous repeating orbit with approximate daily revisits. It is a logical orbit for a reconnaissance satellite covering its archenemy South Korea. Atmospheric drag would require some orbit maintenance capabilities to keep it synchronous.

As with the launch of the first satellite in 2012, one can expect some pundits, self-described experts, and talking heads dismissing and denigrating this real achievement of DPRK. As in 2012, this is irresponsible, unfair, and consequential and may lead to a dangerous miscalculation by appeasement-inclined ideologically-driven policymakers.
Ten years ago, we emphasized that North Korea had been showing continuous improvements in and mastering long-range ballistic-missile and related space-launch and satellite technologies. Given the country’s size, isolation, and international sanctions, it was and is a truly remarkable achievement. It was clear in 2012 that it was only a question of time when North Korea would achieve indigenous intercontinental ballistic missile capability and deploy operational satellites.

That future has arrived.

Retirees from the aerospace industries and attendees gathered on November 8 to discuss about the progresses and news in aerospace, the new AIAA book volumes by Mr. Mike Ciminera (The Aircraft Designers A Northrop Grumman Perspective), AIAA Technical Conferences and Forums, halo orbit / Artemis’ distant retrograde orbit. and others.
Starship Test
Flight 2 (Nov. 18)

The Future of US Robotic Planetary Exploration (Nov. 18)