Two episodes from the history of astronautics: Similarities and differences

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I. Introduction

Modern astronautics arose about a century ago, and during this time many critically important events have occurred, which at times have developed into triumphs and tragedies. But often these events were known and significant only to a limited circle of "initiates", and if this wasn't entirely true, then now they have already found themselves in oblivion. However, it was they who at times turned potential tragedies into actual triumphs, and sometimes vice versa. This work tells about two such events – about first that happened a long time ago in the time of the Moon Race. The second is just happening in front of everyone, but no one, except perhaps people counted on the fingers of one hand, simply notices it. Nevertheless, it seems to us that they could be good markers of the changes that have occurred in modern society over the last century. And their comparison, perhaps, will say something not so much about modern astronautics, but about society as a whole, highlighting the secret that is gradually becoming apparent.

II. What do dog sleds have to do with the Moon Race?

Sometimes I think we are the devils that are storming the heavens.
W. von Braun

The first of the episodes in question took place during the Moon Race. A month after Soviet triumph in space in April 1961 – flight into space of the first man of Earth, the Soviet cosmonaut Yuri A. Gagarin, US President John F. Kennedy announced that during the current decade, that is, the 60s 20th century, the United States will land a man on the Moon and return him safely from there. About a year later, Soviet government decided to do the same and at get ahead of the Americans. Thus began the Moon Race. Although the second participant didn't advertise these plans until the very end, nevertheless, all participants knew about them quite well.

At the same time, the first work directly aimed at implementing a manned flight to the Moon began in the United States at least 3 – 4 years before the speech of its president. And by that time it had already become clear that to achieve this goal, a grandiose launch vehicle would be required, capable of launching at least 150 – 170 tons of payload into low Earth orbit. But only a year later, in February 1962, the first flight into space by an American astronaut was made on Mercury spacecraft, mass of which was less than 1.5 tons. Thus, not to mention the development of the lunar spacecraft itself, in a maximum of 5 – 6 years it was necessary to create a rocket with a payload more than 2 orders of magnitude greater than what had just become available.

Preliminary assessments of Nova project have shown that such a rocket doesn't fit into the technical and economic requirements for the developers. And then it was decided to limit ourselves to a more modest rocket according to Saturn project, capable of launching at least 100 – 120 tons of payloads into low orbit. But then, for each manned expedition to the Moon, at least two launches of such rockets would be required, one to launch the lunar spacecraft into orbit, and the other (or others) to launch its booster module, perhaps divided into separate blocks. These objects would dock in low-Earth orbit, and then the booster module would send a manned spacecraft to the Moon to land on its surface and return directly from there. A flight scheme with more than one rocket would dramatically complicate and increase the cost of lunar expeditions, but by 1960 everyone had already come to terms with this, and it was accepted as the main one.

However, in November 1961, NASA engineer John Houbolt, after trying in vain for almost a year to convince his colleagues and direct superiors, wrote a letter to NASA Associate Administrator Robert Seamans with a proposal to adopt a different flight scheme. In accordance with this scheme, there had to be a special module that would separate from the main spacecraft in lunar orbit and land on the Moon. After completing the program of work on moon surface, it would take off and dock in lunar orbit with spacecraft, to which the astronauts would transfer and return to Earth on it (LOR scheme – Lunar orbit rendezvous). The general opinion about this flight scheme at one of Houbolt's speeches was expressed by the famous aerospace engineer, designer of the first American Mercury spacecraft, Max Faget. He told Houbolt, who was arguing that LOR leads to a significant reduction in the required mass to be launched into low Earth orbit: "His figures lie! He doesn't know what he's talking about!" Well, of course, who doesn't know that by dividing a spacecraft into parts, we won't be able to reduce its mass? It will only increase due to docking nodes, other additional equipment, fuel costs for docking maneuvers, as well as a general increase in the amount of fuel that provides acceleration and deceleration of this spacecraft with larger mass. And Associate Administrator of NASA R. Seamans, responded to the letter much more meaningfully: "...a scheme that has a 50 percent chance of getting a man to the moon and a 1 percent of getting him back", quite sensibly

emphasizing the risks of docking far from Earth at a time when even the first docking near Earth had to wait almost another 4.5 years. During space manned program Gemini on low Earth orbit, in 1966 four successful dockings were performed, demonstrating that astronauts were capable of realizing these operations with confidence. And then NASA was finally convinced of the correctness choice of flight scheme to the Moon. And all the dockings of Apollo spacecrafts were successful, although sometimes they had to be repeated more than once.

But drops wear away the stone, and soon after a letter to NASA management, Houbolt was suddenly supported by Wernher von Braun himself, chief designer of Saturn V lunar rocket and simply a key player on the American aerospace scene, a general epiphany occurred, and already in July 1962, the LOR flight scheme in the program Apollo was officially chosen as the main one. And, moreover, the flight scheme with orbital expeditionary and special landing crafts after the triumphant flight to the Moon of Apollo 11 spacecraft launched by Saturn V rocket began to be considered as classical and, until recently, almost the only one possible for interplanetary flights. It is hardly worth mentioning specifically that it immediately became the main one in the Soviet lunar program. John Houbolt soon received a NASA medal, became a member of the National Academy of Engineering, and exactly 7 years after LOR scheme was adopted, immediately after Apollo 11 landing on the Moon surface, he was personally thanked by von Braun.

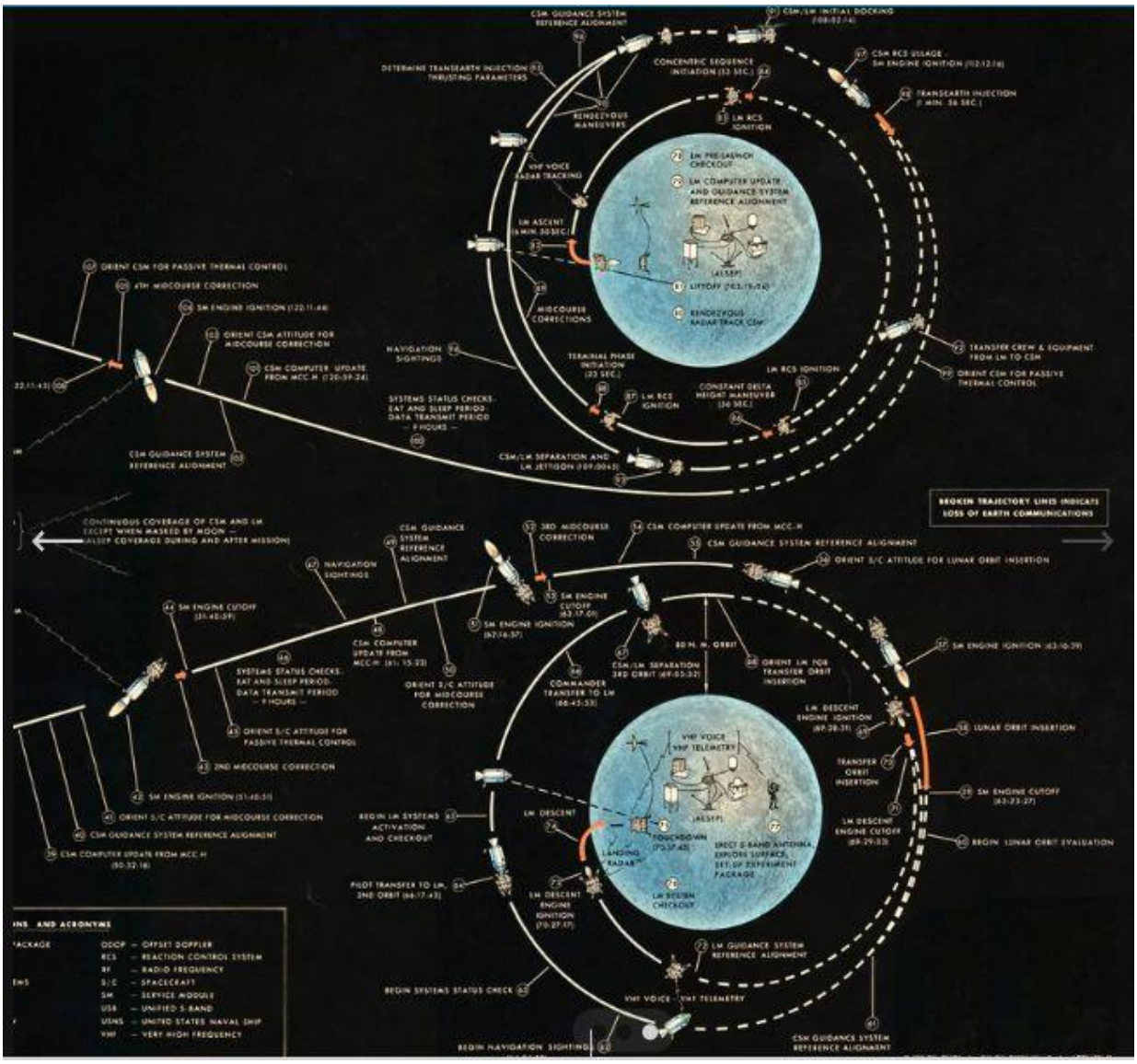

Fig. 1 – Circumlunar fragments of LOR flight scheme of Apollo spacecraft

In Fig. 1 you can see fragments of Apollo spacecraft flight scheme in the vicinity of the Moon. In lower fragment, a stack of two modules flies to the Moon, the main module remains in lunar orbit, and the landing module separates and lands on the surface of the Earth's satellite. After a day or three, the take-off stage of the landing module delivers two astronauts to the third, who was waiting for them in orbit, and separates from the main module, on which they all fly home together, see top fragment of Fig. 1.

Then after Apollo 11 flight it was argued that in one form or another, docking in lunar orbit was proposed by Wernher von Braun himself, together with Heinz-Hermann Koehle, back in late 1958, by Chance Vought Astronautics in 1959, and by others. Of course, victory always has many fathers... But John Houbolt turned out to be the most persistent. And he gleaned his knowledge from the book in Russian "Conquest of Interplanetary Spaces" by Yuri Kondratyuk, published in Novosibirsk in 1929, in which, among other ideas (for example, the perturbation maneuver), it was first proposed to build a separate ship for landing on the surface of the target planet, and explained why this should be done. A copy of this book was discovered in the Library of the American Congress. In this regard, the flight trajectory of Apollo lunar spacecraft is now commonly called "Kondratyuk's route" or "Kondratyuk's loop".

Moreover, the real name of this man is Alexander Ignatievich Shargei (through his mother, Baroness Lyudmila Schlipenbach, he is a descendant of the famous Swedish general Schlippenbach, who was captured by Russian troops in 1709 in the battle of Poltava, and remained in Russia). A former gymnasium pupil who studied briefly at Petrograd Polytechnic Institute and was called up to the front of the First World War with the rank of ensign, in 1918 he fought in the ranks of the White Army, and after he left it, in 1919 he used the documents of a deceased acquaintance to avoid repressions of Cheka/OGPU/NKVD, and then left his native Ukraine into Siberia for the same purpose. It wasn't possible to do this completely, and soon after the publication of the above-mentioned book, he received his almost inevitable 3 years in the camps as a wrecking engineer, but the investigative authorities didn't find out about his past, so that he got off with a sentence that was ridiculous for those times, which, moreover, instead served in the camps in a special design bureau for imprisoned engineers in the same Novosibirsk. And with the beginning of the war with Nazi Germany, he volunteered to go to the front and died in February 1942 in the snowy fields near Oryol City.

Now it's hard to believe, but in 1970, a year after his flight, the first man on the Moon, Neil Armstrong, visited Novosibirsk and picked up a handful of soil near the walls of the house in which prisoner Yuri Kondratyuk/Shargei/Schliepenbach lived and worked. And this isn't an urban tale from Soviet times, but an event reported on official NASA website (see https://www.nasa.gov/history/50-years-ago-armstrong-visits-the-soviet-union/). True, it doesn't say that this was not the "house of Yuri Kondratyuk", which he never had, but the prison building in which Alexander Shargei sat and worked for the good of his homeland. However, the soil collected by Neil Armstrong even near the walls of the former prison confirms, as well as any other, the influence of Yuri Kondratyuk on the course of Apollo program.

In the same year, a crater on the far side of the Moon was named after Kondratyuk.

However, the question arises of how a fugitive, who didn't have his own housing, and who earned his bread by the hard physical labor of a greaser, wagon trailer, and mechanic at granary, on which he spent almost all his time, simply and naturally, as if in passing, came to the idea, which after more than 3 decades was difficult for American spacecraft designers to perceive? It is natural to believe that this was due to the fact that his childhood passed through a different era, before Great War and Revolution, in the years when all intelligent people were excitedly following the polar races, first to the North and then to the South Poles of the Earth. And the young gymnasium pupil, also couldn't help but become interested in them. But there are great similarities between them and the Moon Race. In both cases, they occurred at the limit of human capabilities and at the limit of technologies available at that time.

In the years preceding the polar races, the technology for traveling at high latitudes had been sufficiently developed. It was found that the optimal method is to use dog sleds, and the dogs should be northern huskies that have undergone thousands of years of natural selection. In addition, since after reaching the Pole it was necessary to return, it became clear that carrying all the necessary supplies with you first there and then back would be an unjustified excess, and they quickly came to the idea of creating a chain of intermediate camps (when possible), in which they left that supplies that was necessary for returning from this camp to the camp created even earlier. At the same time, some of the dog sleds periodically became unnecessary, at the beginning of the path the support group returned to the base camp on them, and then they were "dropped" in the same way as later, during space launches, spent rocket stages were dropped. But, unlike space flights, the "discarded stages" in the Arctic and Antarctic were used even more fully: unnecessary huskies were slaughtered and their meat was fed to the remaining dogs, and sometimes even to members of the expedition. Apparently, the well-known and still unrealized idea of one of astronautics founders, F. Zander, about using already unnecessary parts of a spacecraft as fuel also arose from observations of races to the Earth's poles. But A. Shargey probably took from them an understanding of the critical importance of creating intermediate bases, without which expeditions to the South Pole would have been generally impossible using the technologies then available, with a specific power supply 3 orders of magnitude less than during flights to the Moon.

In Fig. 2 shows the routes of R. Amundsen (blue curve) and R. Scott (red curve) expeditions that reached the South Pole in December 1911 and January 1912, while R. Amundsen had 8 intermediate bases, and R. Scott had 11.

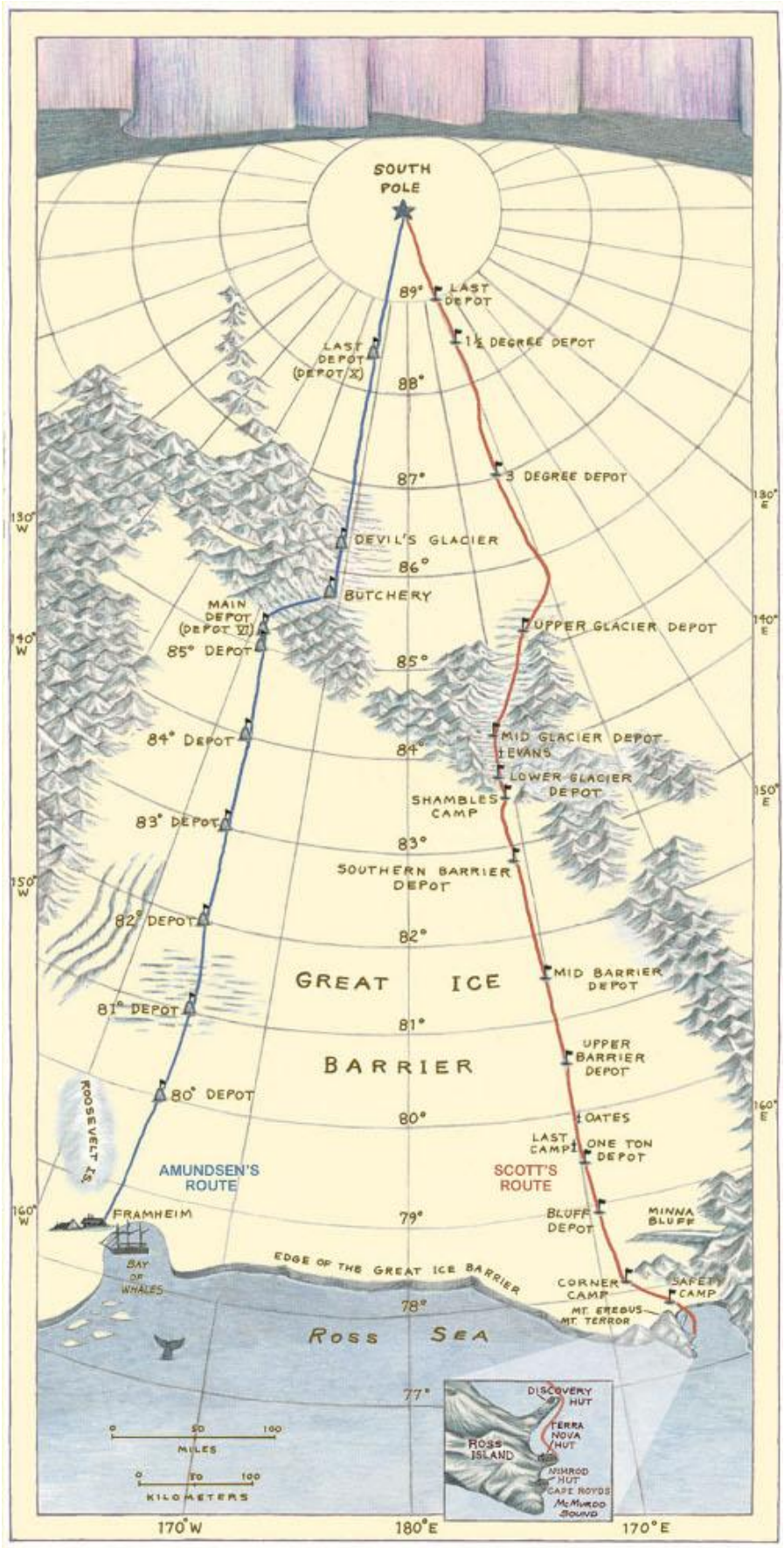

Fig. 2 – Routes of R. Amundsen and R. Scott expeditions to the South Pole with marks of intermediate bases location

Unlike Antarctica, on the Earth-Moon route it turned out to be possible to have only 3 points of analogues of intermediate bases location – in near-Earth and in lunar orbits, and on moon surface. But only one of variants might

be realized with the aid of a single rocket on the Earth – with using LOR, that was Kondratyuk's route, and it played fundamentally important role. This can be interpreted as a lesson that a broad view of a new complex problem, and the use of results obtained in seemingly completely different types of human activity, can provide solutions to difficult problems that cannot be solved in any other way.

III. And what does Sayan disaster has to do with saving Starship system?

There is not a nail to hang a picture on, nor a shelf to receive the bust of a hero or a saint.
H. Thoreau

Hardly anyone has any doubts that the most important space program today is the program to create Starship reusable rocket system. At the same time, during its implementation, many difficulties and problems quite naturally arise, some of which were critical for the implementation of this program and led to significant changes in the system design. However, the program is now at flight test stage, and many people think that all the critical problems are behind them. Such judgments are also facilitated by policy of SpaceX, the developer and creator of this rocket system, which is aimed at hiding any important problems identified during flight tests, and highlighting all sorts of little things to the fore, which makes it possible to demonstrate progress and hide the real difficulties that may be discovered in the first test flights of still very "raw" system.

And on the very first flight, which occurred on April 20, 2023, such a problem was discovered. Moreover, as it turned out during the second flight on November 18, 2023, it became not just fundamental, but systemic, that is, it was a certain inherent property of this rocket system. Wherein from the information available to us it follows that this problem wasn't foreseeable and turned out to be completely unexpected. However, this problem itself was once well known to rocket designers, causing them enormous problems at times, but usually being solved by them after sufficient effort was applied. And in recent decades, it seemed to disappear by itself from the horizon of their perception. This problem is the longitudinal self-oscillations of rockets named Pogo.

The process of Pogo-type self-oscillations, as is known, is excited when the frequencies of hydroacoustic oscillations in the lines supplying at least one of the fuel components to the rocket engines and the own elastic vibrations of its hull are close or multiple. There is a positive feedback between these two oscillatory processes, which leads to their mutual reinforcement in the case of resonance or multiplicity. If Pogo begins, it very often intensifies until the oscillatory system is destroyed. In this case, usually there was an explosion of a rocket or rocket stage. And the name of the process comes from a children's toy – a pogo jumping stick, which was popular in those years when American rocket engineers first really encountered this formidable phenomenon, see Fig. 3.

Fig. 3 – Taylor Twins jump on pogo sticks down a quiet London street

During the first flight of Starship, hydroacoustic oscillations occurred in the liquid methane supply lines of the first stage engines. They grew relatively slowly, and rocket control system, by reducing the thrust of the engines, temporarily suppressed these oscillations. But after thrust returned to its original level, everything started all over again. And this struggle between the control system and Pogo determined the completely unusual, jerky flight mode of Starship, which ultimately ended in a complete loss of control and its destruction. The developers of the rocket system quickly realized the reason for what happened, and broke the positive feedback between hydroacoustic and elastic vibrations, changing the frequency of the latter in flight mode of two stages combined together, until they separation. This was done by inserting an intermediate compartment between the stages, which also allowed for their "hot" staging that is, starting the second stage engines without completely shutting down the first stage engines.

For reasons unknown to the author of this work, SpaceX not only didn't publicly explain the anomalous, never before seen – jerky flight mode of a stack of stages, but also generally hid information about such a phenomenon. Measures to combat Pogo process that caused it were passed off as actions to ensure hot separation of stages in order to increase the payload mass put into orbit. And the word Pogo itself, as subsequent events showed, was strictly prohibited. What caused such actions cannot be explained within the framework of normal human thinking. Perhaps this was done in order to hide the fact that creator of Starship, that is, head of the program for its development, isn't omniscient, which, apparently, is recognized as necessary for the creator of a spare planet for humanity. No more rational arguments explaining SpaceX behavior simply come to mind.

The introduction of the intermediate compartment really eliminated Pogo in the flight mode of a stack of stages (in fact, not completely, but now it's not worth diving into the relatively small details of a rather complex process). And before the separation of the stages, the second flight of the rocket system proceeded quite normally and in accordance with the plan. The staging also happened exactly as planned. However, after the separation, unexpected troubles began: the first stage exploded when braking by the engines during a boostback maneuver, and the second – at the end of acceleration, which had previously taken place completely calmly and according to plan. Perhaps in the future some SpaceX employee will describe in detail what happened in Starship program in December 2023 – January 2024, but we, external observers, can record and comprehend only the most general signs of the processes taking place in the company then, mainly based on two speeches by representatives of its leadership. These were speech on December 12 with the head of Starbase (spaceport) Katie Lueders in Brownsville, the administrative center of Cameron County, where the spaceport is located, and big speech on January 12 by Elon Musk, the owner of SpaceX, before the employees of the spaceport. It clearly followed from them that the management doesn't understand what actually happened to both stages of Starship in the second flight, and is striving, as quickly as possible, no later than mid-to-late February to conduct a third flight in order to obtain at least some new information for a solution the problems that have befallen them. But, at the end of January, help came to them, which they immediately accepted, and everything changed dramatically. And help again, like 60 years ago, came from Russia.

However, to explain what happened in February – March 2024, we first need to go back a decade and a half. Then, on the morning of August 17, 2009, the largest hydropower disaster in Russia occurred on upper Yenisei River – second turbine unit of the most powerful in Russia Sayano-Shushenskaya hydroelectric power plant (HPP), whose mass was about 2 thousand tons, unexpectedly flew out of the turbine shaft to a height of 14 m, and stream of water from there under a pressure of about 2 megapascals destroyed HPP turbine hall, see Fig. 4. In this case, 75 employees of the HPP were killed, 2 more turbine units were destroyed, and the remaining 7 were put out of action. The station was de-energized, and there was a threat of a rapid water overflow over the dam, which was prevented after opening the gates to release water manually.

The official structures were completely at a loss; they didn't understand what had happened. The author of this paper, having nothing to do with hydropower engineering, but being a physicist who graduated from Moscow Institute of Physics and Technology and by that time had long since received his Ph.D. with degree in mechanics of liquids, gases and plasma, at first observing with some surprise the unfolding orgy of official incompetence, he decided to understand what had happened at least for himself. Direct contacts soon arose with V. L. Okulov, who 15 years before the disaster derived the initial equations for oscillations of fluid flow in a pipe with a hydraulic turbine located in it. On this basis, a theory of occurrence of hydroacoustic self-oscillations in water head systems of hydroelectric power stations was made, which describes what happened during Sayan disaster.

Fig. 4 – View of destroyed turbine hall at Sayano-Shushenskaya HPP after the disaster

And when 15 years later, on April 20, 2023, the author watched live this completely unusual, jerky flight mode of Starship, the understanding immediately flashed in his brain that it couldn't be anything other than amplitude modulation of Pogo-type self-oscillations. When he announced this, almost everyone began to argue in unison that these were information failures, signal processing artifacts, and God knows what else, but not the real flight mode of first Starship stack. This wasn't at all affected by what soon became clear: by the end of its more or less controlled flight, the rocket hadn't gained even a half of the required speed and altitude, which means it was flying completely differently than planned. At the same time, SpaceX management talked about anything, but not about this fundamental result of the first flight. Once again, an orgy of public incompetence and significant silence from SpaceX unfolded.

I had to examine self-oscillations again, but now self-oscillations of Pogo-type. It revealed that their theory didn't exist before, previously, all problems were solved experimentally, on scale models and in test flights: in the fight against Pogo, when testing the manned version of Titan II rocket, carrier of Gemini spacecrafts, it took 24 launches. It immediately became clear that under certain assumptions about the fulfillment of one of the boundary conditions, theory of hydroacoustic self-oscillations in water head systems of hydroelectric power plants, at least in terms of calculating the key parameter – frequency of hydroacoustic oscillations, can easily be transformed into the theory of Pogo-type oscillations. In the first test calculations, data on known cases of Pogo on Saturn V rocket were checked, everything came together perfectly, and by the end of May 2023, the new theory had already begun to be used in application to the analysis of Starship behavior. And soon Elon Musk began talking about interstage hot separation compartment, and this showed that SpaceX also perfectly understood what happened on the first flight, but didn't want the outside world to know about the reason for this. However, for it, strictly speaking, only emotions, forecasts about the time of the next flight and all sorts of little things were interesting, perhaps important in themselves, but worthless without solving the main issue at that moment.

True, the solution to Pogo problem, chosen by SpaceX, along with its advantages – speed of implementation, the ability to solve some other problems associated with Starship, and also made it possible to hide the very problem of self-oscillations occurrence from the outside world, had one significant drawback. The intermediate compartment eliminated Pogo during flight of a two-stage stack (and then, strictly speaking, not completely), but could do nothing to help against the occurrence of similar self-oscillations in other flight modes, of which reusable rocket system had much more than a conventional disposable one. And this drawback wasn't slow to manifest itself: as mentioned above, on the second flight, both stages of the system exploded after separation, and it was completely unclear to SpaceX management what to do about it now.

Against the background of these events, the author of this work sent his first paper on October 5, 2023 to the well-known resource arXiv.org with analysis of the results of Starship first flight. In it, among a large amount of information, for the first time in the public domain, the relationship between the frequency of hydroacoustic oscillations in the feeding line of rocket engine and the pressure drop across its pump was described. On October 9, this article was supposed to be published, but at the last moment it was unexpectedly delayed for an unprecedented period for the arXiv under various completely vacuous pretexts. Finally, already in November, shortly before the second flight of Starship, arXiv decided not to publish it. The reasons officially given were: "Our moderators have determined that your submission is on a topic not covered by arXiv or that the intended audience for your work is not a community we currently serve". In general, think what you want, we ourselves don't know why we won't do our job, and we won't tell you anything.

A month later, after the second flight of Starship, on December 6, 2023, on famous NSF aerospace forum (NASASpaceflight), the author, as his first post, posted brief information about the paper rejected by the nameless arXiv moderators, and wrote a few lines about the topic of that work. This short post caused such a heated discussion on NSF forum that it soon suppressed all other issues discussed there in the thread about the second flight of Starship. In this regard, to continue the discussion of this issue, on December 15, one of the forum participants (not the author) created a separate topic, which, without explanation, turned out to be closed at the same day, 13.5 hours later, and author was denied access to the forum. Moreover, it later turned out that the author was then denied access to indefinite number of administrative and information sites throughout Cameron County, Texas, where the economic influence of SpaceX is dominant.

Let the readers decide for themselves whether there is a connection between these strange events, but according to available information, no later than December 14, 2023, SpaceX President and Chief Operating Officer Gwynne Shotwell became aware of the work rejected by arXiv. True, as follows from what was described above, these blockages didn't move SpaceX management any closer to understanding what happened to Starship stages on the second flight. However, when information about this work, as well as about 5 other papers published on the website http://www.synerjetics.ru, which examined ground tests of the booster power plant and the second flight of the rocket system, apparently came at the most critical moment to SpaceX Vice President, Build and Flight Reliability William Gerstenmaier. And, judging by the available information, the third flight of Starship was postponed for an urgent reworking of control algorithms for the power plants of both stages.

Knowing frequencies of elastic oscillations of the structure and hydroacoustic frequencies of the fuel systems of the stages before explosions from telemetry, as well as the above-mentioned relationship (conversion formula) between the frequency of hydroacoustic oscillations in the rocket engine feeding line and the pressure drop across its pump, in the third flight of Starship it was possible to separate these frequencies and eliminate the very possibility of Pogo excitation in those flight modes that led to explosions in the second flight. But the impossibility of fully using Pogo theory (the equations weren't given in public access) didn't allow the booster to complete its flight as planned, when the engines switched to feeding from a special landing tank with other geometric characteristics. That is, SpaceX again found itself completely unarmed against the newly emerged Pogo process on the engine feeding line that was put into operation for the first time (see http://www.synerjetics.ru/article/paradox_eng.htm). Although solving Pogo equations along the oxidizer line for this design case would immediately make it possible to successfully change the power plant control algorithm in this mode and make a soft splashdown of the booster on the ocean surface. But now they will have to demonstrate this only on the fourth flight.

The changes in the mood of SpaceX management are best illustrated by 2 speeches its owner and chief engineer gave at the launch site during less than 3 months of 2024: January 12 and April 4. The first talked about the problems of Starship second flight and that the release of oxygen from the second stage for some reason led to its explosion after tens of seconds. And in the second speech Musk was said about the success of the third flight, that this year there will be 5 – 6 more test launches, that in the next two flights booster will make a soft landing on the water and be caught by a giant Mechazilla at the launch position, that new ones are already being built, more powerful versions of Starship, and that missions to the Moon and Mars are just around the corner. Thus, Starship program was saved, which, as it seemed to management of SpaceX, with incessant explosions was at the turn of 2023 – 2024 in a deep dead end. This is what the appearance of the ability to suppress self-oscillations of Pogo-type (which officially doesn't exist) means, at least after they were identified as a result of previous disaster, by varying the engine thrust – the operating modes of the booster's engines during landing, apparently, had already been recalculated by that time.

It should be noted that information about paper «Paradox of Starship two flights and its resolution» mentioned in the previous paragraph, which summarized the results of all its first flights, appeared on April 12, 2024 on NSF forum. And this topic was deleted without a trace in for no more than 20 minutes. This is the freedom of information on this forum, and this is the reward to pay for Starship saving.

And it must be said that the use of the above-mentioned recalculation formula will allow, as is already quite clear, in the fourth flight, which hasn't yet taken place, to complete the fight against the manifestations of Pogo on the existing version of Starship. However, there are only 4 copy of this version for test flights left. And then new versions of this rocket system will fly. And for them, in the absence at SpaceX of a full-fledged theory, everything will start all over again. Unexpectedly for the developers, self-oscillations of Pogo-type will arise and rocket stages will explode again. And this will be the price for non-recognition of reality and for the reluctance to clearly and directly use the theory created precisely from the experience of testing the first sample of Starship on April 20, 2023.

IV. Similarities and differences in reactions of regimes separated by an ocean and a hundred years to sudden innovations

I am just going outside and may be some time.
Lawrence Oates

This paper compares two episodes from the history of astronautics. The first of them, in one form or another, began at the time of the emergence of modern astronautics and lasted at least 60 years until the completion of flights to the Moon. The genesis of the second is the launches of the first "large" liquid-fuel rocket A-4 (V-2) from Baltic test site Peenemünde, but the main events there took place within one year, starting on April 20, 2023. The differences between the two stories are obvious. But discovering similarities between events in the countries of victorious Soviet socialism and long-standing post-war and modern liberal democracies may be more interesting.

It has already been mentioned that Alexander Shargei (Yuri Kondratyuk) hid from Soviet political police all his life from 1919 to 1942 (when he gave it up for his homeland), and, nevertheless, in 1930, shortly after the publication at his own expense of that book with Kondratyuk's route, received his 3 years of camps. But then OGPU wasn't interested in rockets and space; executions and imprisonments for rockets would begin 8 years later. And OGPU couldn't find out that he served in the White Army. And they arrested him for the fact that in the same 1929, while working in Siberian regional office "Hleboproduct (Bread's Product)", he supervised the construction of the largest wooden granary in the world "Mastodon" for 10 thousand tons of grain, and it was built without a single nail, since "Hleboproduct" didn't have nails. A year later, he and many who worked with him were repressed "for sabotage", since local authorities considered that this granary without nails could collapse, and decided to play it safe in advance, but "Mastodon" stood for more than 60 years, until, in the end, it burned.

Some reader can draw a parallel between that distant history and the fact that Yury Lobanovsky was virtually repressed on all sites that SpaceX could have influence after it received information that at this stage literally saved Starship program from Pogo. But, of course, this is different, because SpaceX repressions are virtual, Starship isn't "Mastodon", and it will most likely destroy in flights more than once due to SpaceX actions to your own detriment.

Another inquisitive reader, perhaps impressed by the stories told, will declare that people from the 60s of the 20th century has moral superiority over modern ones. And it may seem to him that those "devils" who began to storm the heavens under red Nazi banners turned out to be head and shoulders above and more honest than those who are trying to do this now under the flags of democracy, progress and tolerance. He can also remember movie "Don't Look Up", released just 2 years ago, which tells a completely different, but in some ways very similar story. But and this is completely different. After all, people who are supposed to play a vital role in the colonization of Red Planet, thereby giving a chance to save our entire civilization, cannot turn out to be less moral than those same "devils"? Is that possible?

And the "virtual repressions" against the author of this work is such that SpaceX administration, apparently, wants him to voluntarily and quietly disappear from the epic testing Starship system along with such concepts as self-oscillations and Pogo, as, during returning of R. Scott expedition from the South Pole, Captain L. Oates on his frostbitten feet voluntarily left tent and gone into white silence and cold, so as not to be a burden for the remaining members of the expedition and to give them a chance to escape. However, they were unable to take advantage of this chance. Let's see if "virtual frost" that they catch up around them for almost a whole year will help SpaceX a lot, by the way, devaluing the deaths of 75 people who died during that Sayan disaster.

Inner Kolyma,
06.05.2024 Yu. I. Lobanovsky