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IGOR VOLK: "WHERE AVIATION IS, THE COUNTRY RISES"

At the very beginning of cosmonautics, Ukraine distinguished itself as a space state. In the field of space conquest, we had significant achievements: the Ukrainian was in outer space, the Ukrainians participated in international programs, produced space transport. Among the astronauts of the USSR, many who were born in Ukraine and made a significant contribution to the development of the world astronautics. Such personalities include the 58th cosmonaut of the USSR, the 143rd cosmonaut of the world, the Hero of the Soviet Union, test pilot Igor Petrovich Volk. The article provides some historiographical information and notes the small number of such studies on the personality of the astronaut. It is stated that materials of a journalistic and popular science character prevail among scientific achievements. In the article, the authors detail the life path of a prominent astronaut. I. Volk studied flight business in Ukraine - graduated from Kirovograd military aviation school of aviation pilots. His activity began in 1965, and from May 1965 to 2001 he worked at the MM Gromov Flight Research Institute. Igor Volk has devoted many years of his life to trial work in the sky. He had the knowledge and experience to test the corkscrew of almost all types of aircraft that were in the USSR at the time. The authors emphasized that it was he who, during the execution of the "corkscrew program" on the Su-27 aircraft, first performed the so-called dynamic braking - "put the aircraft on its tail." This aerobatic maneuver is now known as the Pugachov Cobra. Igor Volk tested in the atmosphere a prototype of the Soviet multiple spacecraft fighter. This project was defeated, but later another project was developed - Buran, the commander of which was appointed Igor Volk. As part of the development of this project from July 17th to 29th, 1984, Igor Volk made a space flight as a cosmonaut-researcher for the Soyuz T-12. Immediately after returning from flight to Earth, an experiment was conducted to control the Tu-154LL and MiG-25LL aircraft, which were approximated by the aerodynamic parameters to the "Buran". It was noted that he was at the helm of the aircraft immediately after the flight - none of the astronauts in the world did a similar task. This experiment was strictly classified. The world knew about the successful experiment only in 1988 during the press conference of the head of Glavcosm O. Dunayev. Igor Volk had a special, detailed approach to the test flights: he prepared in advance, thought over every detail, listened to the opinions of colleagues, and used their experience. He never catapulted. Well-known flight experts consider him the key figure in the development of techniques for landing aircraft under the conditions of engine failure.

Key words: *Aviation; astronaut Igor Volk; test pilot Igor Volk; born in Ukraine.*

Introduction

In the field of space conquest, Ukraine had significant achievements: the Ukrainian was in outer space, the Ukrainians participated in international programs, produced space transport. Among the cosmonauts of the USSR, many who were born in Ukraine acquired professional knowledge here and then applied them for the further development of astronautics. Among the natives of Ukraine are Georgy Beregovy, Valentin Bondarenko, Igor Volk, Alexander Volkov, Georgy Dobrovolsky, Vitaliy Zholobov, Leonid Kizim, Pavel Popovych, Georgy Shonin, and many other younger astronauts. The Ukrainian collector and researcher of the history of astronautics Yu. Shevel is one of the first in Ukraine has launched a project of creation a cosmonautics museum, which holds a prominent place of the legendary test pilot, the 58th cosmonaut of the USSR, the 143rd cosmonaut of the world, Igor Petrovich Volk. His innate and acquired qualities in the quality of life had led to the amazement and respect of his colleagues and leadership. It was him - Igor Petrovich Volk - who were renowned as "the king of non-engine landings" by aircraft. Distinguished masters of the flight business noted his powerful intelligence, intuition, coolness and careful riskiness in flight. It was for the first time in the world that he was able to accomplish the experimental task of extraordinary complexity - immediately after a space flight, to pilot a plane for long distance, showing the world his professional capabilities. It is important for the modern generation of Ukrainians to be aware of the connection and to preserve the memory of the outstanding sons of the Ukrainian people.

Materials and Methods

Based on a thorough analysis of documentary testimonials, periodicals, and references, the authors of the article determined their task of generalizing knowledge of the legendary test pilot and astronaut I.P. Volk. To achieve this goal, the authors used methods of analysis and

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synthesis, which allowed revealing the figure of the Ukrainian astronaut. The principle of historicism is also used, which permits us to consider the phenomenon we are studying in its development. Important sources for the study were interviewed by Igor Volk, his speeches on the air and answers to the questions from correspondents. It should be noted that there are no scientific research that would be devoted to the analysis of professional achievements of I.P. Volk. Among the published sources we have distinguished the review of biographical materials (site "Testers", Wikipedia), a few small local history materials (in particular, *T. Logvinova, 2017; M. Sayan, 2009*). O. Merzhanov's article "The King of Non-Engine Landings" is of particular value. Moreover, we referred to The Memories of Igor Volk based on testimonies of test pilots and astronauts, in particular, Anatolii Kvochur, Oleksii Borodai, Volodymyr Sysoev, Volodymyr Shpak, Uralf Sultanov, Oleksandr Garaev, Volodymyr Dzhanibekov. These materials were published in the journal "Aerospace Sphere", as well as on the pages of the all-Russian weekly newspaper "Military-Industrial Courier". In particular, the author of the article, praising the achievements of Igor Petrovich Volk, called him "one of the most prominent test pilots of the twentieth century, who stands on a par with such a legendary figure as Valerii Chkalov. In scale. By talent. And in character" (*Merzhanov, 2017*). Important sources for our study were Igor Volk's interview, his appearances on the air and answers to correspondent's questions (*I.P. Volk answers questions, URL…*). Publications in the world were also analyzed, related to the implementation of the first phase of the Soviet Buran-Energy project in 1988.

Results and Discussion

Igor Volk was born on April 12th, 1937 in Ukraine, in the city of Zmiiv, Kharkiv region. His first school was Zmiev Secondary School No. 2, later he attended secondary school №14 in Voroshilov (now Ussuriysk). The family moved there, he graduated from the 10th grade in 1954 at the high school №5 in Kursk. According to Igor Volk's recollections, pilots from the aero club came to school in the final year of study - they were agitating to study the pilot business. There were a lot of people, who wanted to study piloting, nevertheless, when it was discovered that the main task was in servicing the matériel - the number of applicants declined. But Igor remained and in April 1954 made his first flight. It was then that he formulated the task for himself - to become a military pilot (*USSR pilot-cosmonaut Igor Volk: In orbit, URL…*).

The parents insisted on another profession and therefore sent the boy to join the Kharkov Artillery Radio Engineering Academy. However, from the entrance examinations, Igor escaped after seeing a plane flying over the barracks. Without a wish of wasting his time, in the same 1954, I. Volk joined the Kyrovograd Military Aviation School for long-range aviation pilots. This school was founded in 1951. For almost 70 years of its existence, Kirovograd School has undergone a worthy path of development and reform, has prepared thousands of national and international aviation personnel, and now continues to develop highly qualified potential for the progress of world aviation. I. Volk graduated from the school in 1956 (*Igor Volk. Curriculum Vitae, URL…*).

Having completed his studies in 1956, the pilot I. Volk received an appointment to Azerbaijan, the Baku district of air defense. Here he met his future wife Valentina, they lived together for 50 years, had raised two daughters.

In 1963, the Senior Lieutenant I. Volk retired to the reserve. At that time, the army and navy in the USSR were reduced, "cut alive," so he didn't see any prospects for a military career. However, he did not stop flying. On the contrary, he set himself much more difficult tasks. However, Igor Volk showed perseverance and will in deciding his own destiny: he had a meeting with Valentina Gryzodubova, who in 1963 headed the Research Flight Test Center of the USSR Ministry of Industry and Defense and the intentions of the Soviet Union to become a flight tester (*USSR pilot-cosmonaut Igor Volk: In orbit, URL…*).

In 1965, I. Volk graduated from the School of test pilots at the Gromov Flight Research Institute in the city of Zhukovskyi, Moscow region, subordinated to the Ministry of aviation of the USSR. Seeking to enhance his professional knowledge, in 1969 he graduated from the evening department of the Zhukov Branch of the Moscow Aviation Institute named after Sergo Ordzhonikidze, specializing in mechanical engineering (*Igor Petrovych Volk (12.04.1937-03.01.2017). The hero of Soviet Union, URL…*).

The active stage of the piloting activity has begun. I. Volk worked at the Gromov Flight Research Institute (FRI) from May 1965 to 2001. The names of prominent test pilots have been linked to the FRII:K. Artseulova, M. Gromova, V. Chkalova, B. Kudrin. He was concentrated on the best flight tests' experience of the USSR at the Institute. According to the testimony of Doctor of Technical Sciences and aviation, historian G. Amiryants: "Predominantly, the separation of LDI from CAGI was due to the fact that the flight tests turned into an independent and important section of aviation science" (*Amiryants, 2001*).

In 1995-1997 I. Volk held the position of Chief of the Flight Test Center at the institution. During these years, I. Volk proved to be a highly skilled specialist, who was capable of performing flights of the highest degree of complexity. "At first, I had to work very intensively on self-knowledge, self-preparation in the air. And, of course, I asked for any flights, which were free, but during which you could improve the technique (own technical skills - *authors*)" (*I.P. Volk answers questions, URL…*).

I. Vovk quickly and actively developed his skills as a professional tester. In 1965 he became a test pilot of the 4-th class, since July 22th, 1966 - a pilot tester of the 3-rd class, since 1969 a test pilot of the 2-nd class, since November 16th, 1971 - a test pilot of the 1-st class. He had become a Cosmonaut of the 3-rd class since 1984 (*Volk Igor Petrovich, URL…*). He flew virtually all Soviet aircraft issued in the second half of the twentieth century, but admitted in an interview that at the time, the Soviet Union also designed aircraft that failed (*Krivoruchko, Roshchupkin, 2013: 533*).

Vladyslav Sysoev, flight director of the first class of MM Gromov Flight Research Institute, mentioned: "It seems to me that Igor Vovk may have always, unconsciously waited for the technique to refuse, before losing the situation, as a way out of it. Despite the fact that he started in the military aviation and in flight pilots, the instruction was unambiguous: he refused the engine, especially close to the ground - to immediately catapult and point. We at the Flight Research Institute were the heads of flights, - said his friend, with whom he served in the army. He also permitted Volk to complete the task after landing, simulating engine failure. Consequently, together they developed a landing technique for all types of non-engine airplanes. In the air, anything could happen. But he and a tester went into the unknown and tried to get out of it. I did not know by what sense Igor Petrovich passed this path. He was probably both professional and congenital at the same time. However, that was how a real school was born, which was then taught a new generation of pilots" (*Merzhanov, 2017*).

There were testimonials of professionals who claimed that it was Igor Volk who was the first pilot in the world to

pilot "Cobra Pugachev". Let us turn to the testimony of the Honored Test Pilot of the USSR Anatoly Kvochur: "Igor Petrovich had the knowledge and experience to test large angles of attack, to dump in a tailspin almost all brands and types of aircraft that were in the country at that time. It was he who carried out the corkscrew program on the Su-27, in the process of which he first performed the so-called dynamic braking, putting the aircraft on its tail. Previously, it was thought that such a threatened loss of control, but Su-27 with the Wolf in the cockpit was capable of it (*Merzhanov, 2017*).

However, I. Volk himself repeatedly explained in his interviews that this figure of aerobatics was executed by him involuntarily, by accident, namely, his partner Victor Pugachev on a high-maneuvered fourth-generation Su-27 aircraft showed the European public at the air show in Le Bourget 1989 "Cobra" - a figure that struck both journalists and aviation specialists (*The element of the "cobra" on the Su-27, URL…*).

There were certain and specific clarifications regarding this incredible episode, which testify that it was I. Volk who managed to perform the first execution of the figure, that was then called "Cobra". It was the first time this maneuver had been carried out by accident when his Su-27 plane was brought out of the critical angle of flight due to a flight error and the EDSU system ceased to function. Trying to save the car, I. Wolf turned off a steering control and surprisingly found that the Su-27 did not fall into a tailspin, but returned to horizontal flight. And he deliberately at his own risk repeated the maneuver that day: "When I tested the car at low altitude with a large angle of attack," Igor Volk recalled, "it suddenly became unmanageable. It is necessary to bail out, but with a look at the altimeter, I decided that I still had time to do it, and automatically shut off the automatic control system: it limited the access to the critical angles of attack. And the car started listening to me. I forced the engines, noticing that, it was going far beyond the critical angle of attack (more than 100 degrees), the plane did not fall into a tailspin, and went into normal mode. Then I gained height and deliberately repeated the maneuver. Returning to the base, I reported everything to the general designer. Since then, the maneuver had surprised the public on the air show with the participation of the Su-27. And why Pugacheva? This was my running mate, I passed on the experience to him, and he showed a figure in Le Bourget (France), to the delight of the audience. Agree, "Volk Cobra" sounded ridiculous" (*USSR pilot-cosmonaut Igor Volk: In orbit, URL…*).

Igor Petrovich said he had never aspired to become an astronaut. However, the fate was different. On July 12th, 1977, he was enrolled in the Buran Special Training Team. At the end of 1978, he was appointed a commander of the newly created detachment of the test pilots №1 regarding to the complex "A" of the Flight Test Center at the Flight Test Institute. According to the order of the Minister of Aviation Industry of the USSR No. 263 of June 23rd, 1981 and the order of the Chief of LVI No. 26 of August 10, 1981, a branch detachment of cosmonauts-testers of the USSR Ministry of Aviation, was headed by Igor Volk, and it was created on the base of the LVI named after MM Gromov (*Pilots of the Buran, URL…*).

From April 1979 to December 1980, I. Volk received space training at the YA Gagarin Cosmonaut Training Center. Here, he was fully implemented into the flight preparation program on the Soyuz-T ship and the Salyut Orbital Station. However, he did not leave the test pilot job, having carried out a number of difficult tests and experiments, among them were the tests on a corkscrew of Su-27 and Su-27UB aircrafts, a number of the difficult test works on subsonic MiG-21, MiG-23, MiG-25 aircrafts, MiG-29, Su-7, Su-9, Su-11, Su-15, Su-27 (*Volk Igor Petrovych, URL…*).

The test pilot A. Kvochur characterized the unique abilities and features of I. Volk's character in the following way: "It was not enough to say that Igor Petrovich distinguished from our circle. It was more correct to say that he was unique - Igor Volk. He combined such seemingly incompatible qualities as powerful intelligence, intuition, and enormous physical strength. On the other hand, there were prudence, coolness and simultaneously audacity, even riskiness in flight. They said: the smart uphill would not go ... So, Volk was smart and could. At the same time, he had never sought a senseless risk and constantly worked on himself" (*Merzhanov, 2017*).

From July 17th to July 29th, 1984, Igor Volk made a space flight to the Soyuz T-12 spacecraft, together with Vladimir Dzhanibekov and Svetlana Savitskaya. The duration of the space flight was 11 days 19 hours 14 minutes and 36 seconds. Personal call sign is Pamir-3. Immediately after returning from flight to Earth, he conducted an experiment to control the Tu-154LL and MiG-25LL aircraft, which were close in aerodynamic terms to the "Buran". It was a complex experiment - a flight from the nearest airport to the city of Akhtubinsk from Baikonur in order to assess the pilot's response during a possible Buran piloting after the impact of space flight factors. "It was my job - to fly after the spacecraft, the meaning of my flight" - answered I. Volk when asked by the journalist whether he was without rest, immediately after the space load to sit at the helm of the plane (*I.P. Volk answers questions, URL…*). Igor Volk did what neither of him, nor after him, did any of the astronauts of the world.

On July 29, 1984, for the courage and heroism displayed in this flight, the Presidium of the Supreme Soviet of the USSR awarded I. Volk the title of Hero of the Soviet Union with the award of the Order of Lenin to him. This experiment was strictly classified. The world knew about the successful experiment only in 1988 during a press conference of the head Glavcosm of O. Dunayev (*Tarasov, 1988*).

Years later, in 2007, I. Volk admitted that Buran was created opposed item to its American counterpart. And the trouble was that they called it a spaceship, not an airplane. Therefore, his demands were severe. As a result, an apparatus was created at the plant in Tushino in 84 that on November 15, 1988 made an orbital flight without human. That event could be prevented the lack of digital systems capable of solving the complex problems. And it was a miracle that they were inserted into the automatic system (*I.P. Volk answers questions, URL…*).

I. Volk lifted into the sky and tested the atmospheric analogue of the Buran spacecraft - BTS-002, which was created as part of the project. In 1986-1987 he carried out 13 test flights as a commander and co-pilot (without going into orbit).

The flight of the Soviet shuttle without human was kept in secret. Nevertheless, on October 27th, 1988 a message was published in the New York Times about the future launch of a Soviet unmanned spacecraft according to the official Soviet sources. It was noted that the project had been extremely limited since the beginning in 1982. Also Foreign Ministry officials announced that the foreign journalists were banned from being on Baikonur at launch (*Soviets to launch Shuttle, 1988*). In the fall of 1988, the Western press discussed whether Soviet engineers independently planned their project orbital apparatus. On November 16th, 1988, the New York Times newspaper wrote: "American experts believe that there is no fundamental difference between the American space

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shuttle and the Soviet version, which made its first test flight yesterday. The official photo of the Soviet shuttle demonstrates a ship that is virtually identical in shape and size to reusable US orbits" (*Wilford, 1988*).

The tensions between the USSR and the US in the field of space programs were still going on at the time. However, Igor Volk was well aware that the atmosphere of the race was not acceptable for space, he spoke publicly about this, and in the case of the American shuttle Challenger emphasized the inadmissibility of forcing space projects. On March 4th, 1988, on the question of the special correspondent of Pravda newspaper, A. Tarasov, about the backwardness of the Soviet Union from the Americans in space, Igor Volk replied: "Why should space work be considered as a race, a stadium race? Who's ahead? The universe is endless, there is no finish here… As a pilot I would like to lift the first such ship in the world and bring it out for the atmosphere. However, these issues of self-love, they are here ten. As an engineer, I understand that I have to solve a huge complex of the scientific and technical problems, in which all the links are important, and each one requires enormous attention" (*Tarasov, 1988*).

In 1990, the Defense Ministry abandoned the idea and the Energy-Buran program was phased out. However, the degree of readiness for the flight of the second "Buran" was estimated by 95 percent in the beginning of 1990-s. In 1993 the project was closed. The Energy-Buran program was not implemented, although this project involved enormous resources and, first and foremost, the years of life and hard work of engineers, designers, test astronauts, as Igor Volk. In 1987, Igor Volk was appointed the Chief of the Branch Training Complex of Testing Astronauts (OKPKI). However, he did not leave the real practical activity of the test astronaut and test pilot. Although the Buran program was closed, until 1995, I. Volk remained in the detachment of astronauts and participated in the trials (*Pilots of the Buran, URL…*).

He flew 48 years out of his complete 79. From the total amount, 41 years he was a test pilot. He flew into space in 47, and in 65 he was still at the helm of the plane. Igor Petrovich's total flight hours were more than 7000 hours, of which more than 3500 hours were in test flights. Volk's social activities were diverse and active until the last day of his life. In 1984-1987 he worked as a deputy of the city council of Zhukovsky, in 1986-1990 - the President of the All-Union Tennis Federation of the USSR (1986-1990). 1988 - the President of the Aviation Lovers Federation, a Member of the Executive Committee of the Movement of the Greens (since 1989), since April 1990 - a Member of the editorial board of the magazine "Wings of the Motherland". Igor Volk was elected the First Vice President and later Chairman of the Executive Committee of the Russian Federation of Astronautics. In co-authorship with Vasily Anisimov Igor Petrovich was the author of the book "Goal - 2001. Aviation and Space Technology of the World, as well as the fantastic space cap detective (*Volk Igor Petrovich, URL…*). For his great contribution to the space exploration, public and public peace-keeping activities for the great service to the Motherland by the decision of the Zmiiv District Council of October 28th, 2011 to Igor Petrovich Volk was awarded the title of "The Honorary Citizen of the Zmiiv District".

I. Volk died on January 3rd, 2017 in Plovdiv, Bulgaria. He was buried in the Bykovo Cemetery in Zhukovskyi. Igor Volk was a prominent figure in aviation and aerospace who had recognition of high-profile aviation professionals and eminent astronauts. April 17th, 2015 during the broadcast of Igor Petrovich said: "Where aviation is, the country raises." He was deeply convinced in his words and all his life, his dedication affair, concentration of strength, persistence demonstrated a desire to develop aviation and space. His name will always remain among the prominent people in the history of Ukraine.

Conclusion

Volk's social activities were diverse and active until the last day of his life. In 1984-1987 he worked as a deputy of the city council of Zhukovskyi, in 1986-1990 - the President of the All-Union Tennis Federation of the USSR (1986-1990), since 1988 - the President of the Aviation Lovers Federation, a member of the Executive Committee of the Green Movement (since 1989), since April 1990 - a member of the editorial board of the magazine "Wings of the Motherland". Igor Volk was elected the First Vice President and later Chairman of the Executive Committee of the Russian Federation of Astronautics. In co-authorship with Vasilii Anisymov, Igor Petrovich was the author of the book "Goal - 2001. Aviation and Space Technology of the World, as well as the fantastic space cap detective. He was awarded the title of "The Honorary Citizen of the Zmiivsky District" for his great contribution to space exploration, public and peacekeeping activities, and for his devoted service to the Motherland according to the decision of the Zmiiv District Council of October 28th, 2011. Igor Volk was the glorious son of Ukraine, the pride and beauty of our people. On April 17th, 2015, during radio broadcasting, Igor Petrovich said: "Where aviation is, the country rises". He was deeply convinced in his words and his whole life, his dedication to his work, his concentration of strength, his persistence, and his desire to develop aviation and astronautics proved it. His name will always remain among the prominent people in the history of Ukraine.

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ІГОР ВОЛК: "ТАМ, ДЕ Є АВІАЦІЯ, КРАЇНА ПІДНІМАЄТЬСЯ"

На самих витоках космонавтики Україна відзначилась як космічна держава. У сфері підкорення космосу ми маємо суттєві досягнення: українець побував у відкритому космосі, українці беруть участь у міжнародних програмах, виготовляють космічний транспорт. Серед космонавтів СРСР чимало тих, хто народився в Україні й зробив свій значний внесок у розвиток світової космонавтики. До таких особистостей належить 58-й космонавт СРСР, 143-й космонавт світу, Герой Радянського Союзу, льотчик-випробувач Ігор Петрович Волк. У статті надаються певні історіографічні відомості і зазначається на малочисельності таких досліджень щодо особистості космонавта. Вказується, що серед наукового доробку переважають матеріали публіцистичного та науково-популярного характеру. В статті автори деталізують життєвий шлях видатного космонавта. Зазначається, що І.Волк навчався льотній справі в Україні - закінчив Кіровоградське військове авіаційне училище льотчиків далекої авіації. Його активний етап кар'єри - льотно-випробувальна діяльність - розпочався у 1965 році. З травня 1965 по 2001 рік він працював у Льотно-дослідному інституті імені М. М. Громова. Ігор Волк багато років життя присвятив випробувальній роботі в небі. Він оволодів знаннями та досвідом для випробування "звалювання у штопор" майже всіх типів літаків, які в той час були в СРСР. Саме він під час виконання "штопорної програми" на літаку Су-27 вперше виконав так зване динамічне гальмування - "поставив літак на хвіст". Цей маневр вищого пілотажу нині відомий як "кобра Пугачова". Ігор Волк випробував в атмосфері прототип радянського багаторазового космічного винищувача "Спіраль". Цей проект зазнав поразки, проте згодом був розроблений інший проект - "Буран", командиром якого призначили Ігоря Волка. У рамках розробки саме цього проекту з 17 по 29 липня 1984 р. Ігор Волк здійснив космічний політ в якості космонавта-дослідника корабля "Союз Т-12". Відразу ж після повернення із польоту на Землю був проведений експеримент по управлінню літаками Ту-154ЛЛ і МіГ-25ЛЛ, наближених за аеродинамічними показниками до "Бурану". Сісти за штурвал літака відразу після польоту - жоден із космонавтів світу не виконував подібне завдання. Цей експеримент був суворо засекречений. Світ дізнався про успіх експерименту лише у 1988 р. під час прес-конференції керівника Главкосмосу О. Дунаєва. Ігор Волк мав особливий, виважений до деталей підхід до випробувальних польотів: готувався заздалегідь, обмірковував кожну деталь, дослуховувався до думок колег, використовуючи їхній досвід. Жодного разу не катапультувався. Відомі фахівці льотної справи вважають саме його ключовою фігурою в розробці методик посадки літаків в умовах відмови двигунів.

Ключові слова: *авіація; Ігор Волк; космонавт; пілот-випробовувач; народжені в Україні.*

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