

Professor Ion Stroescu pioneer of aeronautics and particularly of experimental aerodynamics

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I met Professor Ion Stroescu in the '50s, when, immediately after graduation, I was hired as a trainee researcher (together with my colleagues Stefan Savulescu, Alexe Marinescu, Nicolae Camarasescu and Dinu Caprita) by Academician Professor Elie Carafoli, at that time director of the newly founded Institute of Applied Mechanics of the Romanian Academy. As the institute had not yet been assigned a building, it was settled that provisionally its activity would be carried out within the Polytechnic Institute of Bucharest in Polizu Street premises, together with the aviation department which was also headed by Academician Carafoli.

In the room where we were assigned our responsibilities I met two people. One of them was the engineer C. Popescu, in charge of maintenance and operation of the department laboratories and the other was Professor Ion Stroescu, about whose achievements I had heard a lot, while still a student.

He was a man of about sixty years, not too tall but well proportioned, with a pleasant and attractive appearance, a person we immediately felt close to and who, in turn, gave us all his attention and friendship. That is why, almost everything about his life and his achievements we have found out directly from himself, for he liked to talk to us and, in our turn, we liked to listen to him.

Ion Stroescu (1888 ÷ 1961) was one of the pioneers of Romanian aeronautics, very interested in experimental aerodynamics. He acquired the deep scientific knowledge needed to practice this activity, to which he dedicated all his life and overflowing enthusiasm, by his own forces, as he was self-taught, his initial profession being that of sports teacher at the High School in Ramnicu Sarat.

Ever since he was very young he had very challenging ideas for that period, concerning the construction of small rockets, that he fixed in the fuselage of some airplane models of its own conception, managing thus to substantially increase their duration and distance flight. Having heard about Stroescu's experiences, Aurel Vlaicu, who had conceived a rocket motor utilizing solid combustible (gunpowder), contacted him and suggested to work together for making rockets to equip one of his airplanes. Obviously, the proposal was received with enthusiasm.

In the mid 50's, when Professor Stroescu was the head of the aerodynamics department within the Institute of Applied Mechanics of the Romanian Academy, appointed by the Academician Elie Carafoli, he told us about this episode in his life, confessing that, at that time he felt very honored by Vlaicu's proposal, the more so as Vlaicu had a deep knowledge on reaction propulsion and also had lots of innovative ideas.

He remembered their long talks over these ideas amazing by their power of anticipation. Ion Stroescu's activity in aeronautics and experimental aerodynamics was continued and astonishingly extensive. Some of the results of his research in this field are presented in a book entitled „*New Perspectives in aircraft aerodynamics*”, handwritten and illustrated by Stroescu himself, work that has been multiplied by lithographing; a copy can be found in the library of the Romanian Academy.

The chance made possible that the original, owned by the author, be found by Alin Ludu Dumbrava, along with numerous other documents on Ion Stroescu's life and work. Appreciating the undeniable importance and historical value of that book, A.L. Dumbrava, brought it to our institute, where it can be found presently.

The paper, which contained, anticipatory, highly scientific analysis and proposals for solutions to important problems of the aircraft flight at that time, received in 1926 the Adamachi prize of the Romanian Academy.

We mention that until 1926 the Romanian Academy had awarded only two prizes for aviation: the first was awarded to Aurel Vlaicu and the second to Professor I. Stroescu. One of Stroescu's important contribution was his anticipatory theory on small area airfoils, with high wing loading, a theory which he published in 1911 in „*Automobile Magazine*” no. 68, p. 130, under the title „*Small Surfaces Airplane*”. Stroescu's idea was particularly true for high-speed aircraft, which did not exist at that time.

That same year, taking note of some relatively recent works of the great scholar Ludwig Prandtl, Stroescu launched his original ideas on blown wing and absorption of the boundary layer, in order to reduce drag. He presented his theory of blown wing to the Ministry of War, but he wasn't able to convince officials that its application could have beneficial effects on aircraft.

He patented his ideas, but he got the patents after 1925. That year, 1925, Ion Stroescu built the first aerodynamic wind tunnel in the country, which he installed in the gym hall (abandoned at that time) of the high school in Ramnicu Sarat. Unfortunately, he never had the opportunity to make experiments on models in that wind tunnel, because, while being out of town for a short period of time to participate in a scientific session organized by the Romanian Academy in Bucharest, his installation was demolished following the order of the high school director as a result of an inspection report due, apparently, of a complaint made by some envious colleagues.

That school inspector report stated that “Professor Ion Stroescu had built a *personal barrel*” inside the high school gym hall.

Meanwhile, Ion Stroescu studied the aerodynamic wind tunnels design bringing some original and valuable contributions on their operation, including his method of avoiding the air flow separation at the aerodynamic flow curving and the walls of the divergent nozzles, without a deflector blades network, but only by shaping the wind tunnel circuit. This method, still valid today, is, in part, applied to the large subsonic wind tunnel of the National Institute of Aerospace Research and Development (INCAS).

On December 1, 1929, Professor Acad. Elie Carafoli, managed to bring Ion Stroescu at the Polytechnic Institute of Bucharest as his assistant at the *Aircraft Aerodynamics and Mechanics* department.

In fact, this appointment was, as Professor Carafoli himself said, “The recognition of the outstanding ability of this man in the field in which he was to work henceforth without leaving it any moment”.

Here, under Professor Carafoli, was founded and developed the aerodynamics laboratory where Ion Stroescu played a prominent part, in particular, in the design and implementation of a subsonic aerodynamic wind tunnel, in collaboration with Professor Elie Carafoli.

The wind tunnel of high performance at that time was the first of its kind, not only in our country but also in the South-Eastern Europe. Thus systematic experimental studies on wing profiles designed using Carafoli’s method along with tests on aircraft mock-ups of Romanian and foreign design the last modified by Romanian manufacturers -were conducted using that wind tunnel.

In 1937 the aerodynamics laboratory of the Department of Aviation was visited by the illustrious scientist Ludwig Prandtl, who considered that the wind tunnel built at the Polytechnic School was a very useful and valuable achievement. That wind tunnel, located in the courtyard of the Politehnica University of Bucharest, Polizu Street, in service for a long time is presently a museum.

During 1937-1946, Ion Stroescu became the Academician Professor Victor Valcovici’s collaborator at the University of Bucharest and helped him to organize an experimental laboratory within the Fluid Mechanics department.

After establishment, within the Romanian Academy, of the Institute of Applied Mechanics, Iron and Steel and Metallurgy, that later on became the Applied Mechanics Institute, Professor Elie Carafoli appointed Ion Stroescu head of the Aeromechanical department.

The activity of this department started in the building of the aviation department from Polizu Street, then the department was moved at the University of Bucharest and finally, was located in a building made between 1951 - 1953, on a land of Militari parish (today, Iuliu Maniu Boulevard).

The main task which Ion Stroescu had at that time was the conception and designs of a large high performance subsonic wind tunnel, necessary to obtain satisfactory experimental results, both for scientific research and for models tests of Romanian manufacturing aircraft. Because of very low technical and financial resources of the institute, at that time, the subsonic wind tunnel was built using improvised solutions, which later on made its functioning improper in terms of performance and accuracy of results. It is relevant to mention that the fan driving the air flow in the circuit, which shall be projected for each wind tunnel in part, was made from an airplane propeller with the tips cut to the diameter of the area, driven by a jet engine of 300 kW. Also, the six -component aerodynamic balance for measuring forces and moments acting on the tested model were built with own means, in cooperation with the firm Hess, Sibiu.

The result was a measurement tool of great need, but relatively low performance. The aerodynamic flow instead, for which the above mentioned solutions proposed by Stroescu were utilized, was a great success, the air flow being of high quality without current separations from the wall nozzles and having a low turbulence.

Regretted by all who knew him, Ion Stroescu died full of creative force in 1961, after a cruel illness, but some of his ideas and scientific and technical achievements last nowadays.