ELIE CARAFOLI - a fatigueless researcher

PhD. Eng. Horia DUMITRESCU
DOI: 10.13111/2066-8201.2009.1.2.7

Academician Elie Carofoli was an impressive personality in many fileds. He came to the front as an engineer, teacher, manager (in the industrial field - Mija Plants, institute director), but above all as a fatigueless researcher.

I have met him especially under this latter state, as I have personally worked with him in the past 10 years of his life (1973-1983).

The scientific activity of Academician Elie Carafoli can be divided into various stages**:** The Parisan stage, The Polytechnical School in Bucharest-the aircraft chair, the Romanian Academy stage- IMA and the IMFCA stage.

The Parisian stage

Staying in Paris, which was in the van of aeronautic research has been a wonderful experience for the young Carafoli who had started his scientific activity at the Saint Cyr, part of Sorbonne. As a close collaborator of professor Albert Toussaint, the institute director, he was part of the **Toussaint Carafoli Tank** project. He has elaborated many scientific, technical and experimental works, both on his own or as a collaborator. Among these, the projects referring to the aerodynamic profile theory are the most remarkable, such as:

- **Aerodynamique des ailes d'avion** , Libraire Chiron Editure, Paris 1928
- **Theorie et traces des profils d'ailes sustentatrices**, in collaboration with A. Toussaint, Libraire Chiron, Paris 1928
- **Methode generale pour (16)**, **(17)**.

The Polytechnical School (Bucharest) stage (1928-1948)

After achieving a doctor's degree in 1928 with the doctoral dissertation "Contributions to the sustentation theory in Aerodynamics", he returns home and inaugurates the first course of **aircraft aerodynamics and mechanics** in October 1928 at The Polytechnical School in Bucharest. He founded within the The Polytechnical School in Bucharest, The Aeronautics and Fluid Mechanics Chair which he led for 45 years until 1971. During his time, on this structure The Aviation Section was created, which became later on the Faculty of Airspace Engineering and which currently works within the University **Politehnica** of Bucharest.

As a teacher, Elie Carafoli was the founding father of the Romanian Aerodynamics school where many generations of specialists were formed along the pass of the years. Among his former students we can cite great teachers, researchers and engineers who have contributed in turn to the continuous development of this specific field.

Under his direct lead the basis of aerodynamic experimental research were established by the founding of the aerodynamic laboratory within the **Politehnica University** in Bucharest. The wind-tunnel within this laboratory was the first istallation of this type in the South-East of the Europe and contributed to an ardous experimental research activity. His systematic experiences on aerodynamic profiles designed accordig to his own methods are remarkable. The round profiles category was named, by some foreign well-known scientists [18], [19], after his name **Carafoli profiles**.

Also, Elie Carafoli enlarged the experimental field for the finit anvergure wing determining not only the global lift, strenght and moment coefficients but also the pressure distribution on the profile, in different wing sections for imposed wing aspect ratio ranging between 2 and infinity.

The experimental research in the Polytechnical School laboratory [6] was continued under other aspects too [5], [6].

The IMA stage

A new stage in Elie Carafoli' s activity began in 1948 when the Professor – elected at the moment official member of The Romanian Academy was invested with the task of organizing and conducting the scientific research in the applied mechanics filed.

This was the institutionalized research stage during which Elie Carafoli gathered around him many young collaborators, who were mostly former students and passed on his enthusiasm for the scientific activity. Elie Carafoli has formed a great number of researchers himself, creating this way a Romanian aerodynamics school, recognized as such both internally and abroad. Moreover, he has managed to cultivate the interest of some of his collaborators in other fields of fluid mechanics, their achievements also representing internationally acknowledged contributions. Among his collaborators we can cite academician N. Tipei, academician N. Patraulea, academician V. N. Constantinescu, Dr. St. N. Savulescu, Dr. Al. Marinescu, dr. D. Pantazopol, Dr. T. Hacker, Dr. L. Dumitrescu, Dr. L. Librescu, Dr. D. Mateescu, and Dr. A. Nastase.

At the same time he has understood that the modern science of mouvement-mechanics – is based on three pilings ensuring its balance, namely mathematical modeling, numerical simulation and experiment. Although he was a remakable creator of aerodynamics models and methods (among with we can cite: the low aspect ratio wing with lateral jets, the hydrodynamic analogy for conical motion of high order applied to different wings at supersonic-hypersonic flows, supersonic flow with combustion models), Elie Carafoli paid a great importance to experimental research for validating the results. Five experimental equipments (wind - tunnels) were built, of which the most important – the 2×2 m subsonic wind-tunnel, equipped in 1978 with a six-component ballace – is still functionning at INCAS.

The main collaborators, famous researchers from both inside the country and abroad who have contributed to these researches were: I. Stroiescu, N. Camarasescu, L. Dumitrescu, Al. Marinescu, St. Savulescu.

The scientific work of the academician Elie Carafoli contains more than 100 scientific articles of which we can mention the following which are reference literature in the field:

- **High- speed Aerodynamics** (published in English in 1956, in Romanian in 1957 and in Russian version in 1960)
- **Wing theory in supersonic flow** (Pergamon Press, Oxford 1960)

An essential moment of this period was represented by the National Conference of Applied Mechanics, Elie Carafoli being the president of the organizational board. The Conference marked two decades since the founding of the Applied Mechanics Institute of the Romanian Academy.

The IMFCA stage (1977-1983)

In connection to this stage i cannot but mention the moment when professor Carafoli stated what i call his „will to his apprentices".

Being invited to take command over the Institute of Fluid Mechanics which had been transformed into an Aeronautics Design institute, the Professor declined this offer and bringing us together in the board room he told us: „take things as they are, employ this turn as an opportunity to endow the laboratories but keep in mind that you should return to the Academy where you belong, whenever the circumstances will allow".

The working environment in a semimilitarized institute alienated a great number of researchers from their scientific preoccupations (scientific seminars, fruition publication, scientific performances); as a result, the number of those around professor Carafoli gradually diminished.

Among the last work mates of the professor we can cite: D. Mateescu, C. Berbente, St. Staicu, M. Neamtu, I. Paraschivoiu, R. Popa, E. Serbanescu and the undersigned, who has edited the last work of Elie Carafoli.

At present, the scientific research in the aerodynamics runs its course at INCAS which under a new lead/administration transits an auspicious moment; at the Aviation Chair, The Aerospace Faculty and at the Romanian Academy - ISSMA there are Fluid mechanics and Aerodynamics departments.

To conclude, i express my honor of having been involved in Elie Carafoli's studies as well as my deep gratitude upon the matter.

VORTEX THEORY OF THE IDEAL WIND TURBINE

H. DUMITRESCU, V. CARDOS, A. DUMITRACHE, Florin FRUNZULICA.