

Scientific Biography and Bibliography of Professor Stojan Sedmak

Aleksandar Sedmak and Simon Sedmak

Professor Stojan Sedmak was born in 1929 in Kratovo, then Kingdom of Yugoslavia. He finished high school—gymnasium in Belgrade in 1948, and graduated in 1954 from the Faculty of Mechanical Engineering, University of Belgrade. Afterwards, he completed his magisterium at the Faculty of Natural and Mathematical Sciences, 1970, and came back to the Faculty of Mechanical Engineering for his D.Sc. thesis, 1977, both University of Belgrade. His professional career started in Bugojno, ex-Yugoslavia, at the Factory “Slavko Rodić”, 1954–1958, to be continued in Sarajevu up to 1961 (Factory “FAMOS”) and in Belgrade up to 1966 (Military Technical Institute). His academic career started at the Faculty of Technology and Metallurgy, University of Belgrade, where he started working as the teaching assistant in 1966 to become assistant Professor in 1971, and full professor in 1981 godine. Officially he has retired in 1995, but he kept on working until he died in 2014.

In his young days, Stojan witnessed a lot of turmoil in his country, even before the Second World War. His family (father Anton, military officer, and mother Ratka, teacher, his older sister Milena and younger brother Tomislav) moved from Kratovo to Negotin (east Serbia nowadays) in 1936, and to Belgrade in 1940. Under strict command of his father and with loving support of his mother he was brilliant student both in so-called First Gymnasium and later on during his studies. His sister Milena married to Aleksandar Vesic and moved to USA, to become the well-known couple in academic circles in Atlanta (Georgia Tech) and Durham

A. Sedmak (✉)

Faculty of Technology and Metallurgy, University of Belgrade,
Kraljice Marije 16, 11120 Belgrade, Serbia
e-mail: asedmak@mas.bg.ac.rs

S. Sedmak

Innovation Center of the Faculty of Mechanical Engineering,
Kraljice Marije 16, 11120 Belgrade, Serbia
e-mail: simon.sedmak@yahoo.com

(Duke University). The family name Sedmak is well preserved at Duke University through the Aleksandar Sedmak Vesic and Milena Sedmak Vesic Scholarship Fund, established by Stojan's own son, Aleksandar Sedmak, the executor of his aunt Milena's estate in 2007. His brother Tomislav is famous Serbian neuropsychiatrist. Stojan married in 1954 to Matilda Jovanovic. Their only child was born in 1955, nowadays well-known professor at the University of Belgrade, Aleksandar Sedmak, who has three children (Simon, Tamara and Tea) and one grandchild, Lara.

Stojan's magister thesis under the title "Some problems of stress concentration in twodimensional theory of plasticity", written in 1968 and defended after long period of reviewing in 1970, was the milestone for fracture mechanics development, not only at the University of Belgrade, but also in the region of South East Europe. It all started with Chap. 5 "Brittle Fracture Theory" which was added to the original version of the thesis upon request of the advisor, Prof. Nikola Hajdin (the president of Serbian Academy of Sciences and Arts 2005–2014). Later on, Stojan performed the first fracture mechanics experiments during his work on doctoral thesis, entitled "Effect of Cracks and Notches to Elastic and Plastic Fracture", together with Prof. Aleksandar Radović, in the Military Technical Institute in Belgrade. Completing and defending of his D.Sc. thesis, under guidance of his advisor, Prof. Kosara Jojic, was just the beginning of intensive research and development of fracture mechanics, and later on structural integrity, focused to the most complicated problems when dealing with metallic materials—welding. Afterwards, application of knowledge, gathered during a decade of intensive research, emerged only naturally through numerous projects, starting with the hydro power plant Bajina Basta. Namely, during its construction, fracture mechanics principles were used to design its crucial component—the pipeline, as well as to assess and prove its structural integrity. Couple of very important papers have resulted and been presented by Prof. Sedmak at the Conferences in Leoben (1984), Waterloo (1977) and Cambridge (1979). Some of these experimental results are still analysed, using modern numerical methods, as was presented recently in Leoben (once again!) by Stojan's grandson, Simon Sedmak, civil engineer, now working on his D.Sc. thesis. One can't escape noticing this fascinating three-generation tradition, which also includes his granddaughter, Tamara Golubovic, teaching assistant at the Faculty of Mechanical Engineering.

Profesor Sedmak is the founder and driving force of prestigious International Fracture Mechanics Summer Schools, dating back to the first one in 1980 godine (1st IFMASS, Smederevska Palanka, ex-Yugoslavia). It all started as the result of cooperation with Prof. Michael Wnuk, whose ad hoc idea turned into 10 success stories, with the last edition in 2007 (10th IFMASS, Zlatibor, Serbia). Large number of experts from all over the world have been lecturers, and many young researchers from the region have had the opportunity to learn about fracture mechanics principles and parameters, as well as structural integrity and its application to pressure vessels, pipelines and their weldments, large and other important constructions.

Another important development was USA-YU project “Weldment Fracture Mechanics”, started in 1982 and ended, but not completed in 1990. Namely, large turmoil in the country was once again to be witnessed by Stojan starting in late Eighties. Anyhow, he was capable to make, as the project leader, excellent team of researchers from all six exYu republics, including tens of young researchers doing their D.Sc. many of them in NIST, Boulder, Colorado. The whole region still benefits from this project and Stojan’s tireless efforts, since the cooperation between University in Belgrade and Novom Sadu (Serbia), Maribor (Slovenia), Osijek—Slavonski Brod (Croatia), Skopje (Macedonia), Podgorica (Montenegro), and Bosnia never stopped. On the contrary, it has spread in the whole region, including Timisoara (Romania), Miskolc (Hungary), Sofia (Bulgaria).

Prof. Sedmak’s contribution to the activities of the Yugoslav Welding Association is also of great significance. He was the president until it was shut down in 2000 and during the Nineties he undertook editing of the Welder journal, later renamed to Welding and Welded Structures, the oldest welding related journal in the region. He was also the honorary member of Romanian Welding Society and a delegate in the tenth International Institute of Welding (IIW) committee which dealt with welded joint fracture mechanics. He was an acknowledged expert in IIW and took part in their annual Meetings a number of times.

In 2001, he founded the Serbian Society for Structural Integrity and Life, along with the journal “Structural Integrity and Life”. He served as the president of the Society and editor-in-chief of the journal until 2007. Thanks to a very active role of the Society in the scope of European Structural Integrity Society (ESIS), the European Conference on Fracture (ECF 22) will be held in Belgrade, Serbia in 2018, coinciding with 50 years of fracture mechanics activities in the region. This is only the natural continuation of activities dating back to the ECF4 in Leoben in 1982, when Prof. Stojan Sedmak was the representative in European Group on Fracture (predecessor of ESIS) for the first time. The most important event in the meantime was the organisation of ECF9 in Varna in 1992, which was “mission impossible”, but was carried out successfully by Stojan and his team, under the sanctions of UN.

As the professor, he taught multiple subjects in the field of chemical and graphical engineering, fracture mechanics, mechanics of materials and welding. He was the head of the Department for general technical sciences and the Department for graphical engineering at the Faculty of Technology and Metallurgy. From 1991 to 1996, he was the director of the programme “Material Reliability and Structure Safety Evaluation” by the European Centre for Peace and Development.

Stojan Sedmak wrote seven books and textbooks, was the editor of 9 monographs and the Proceedings of the Ninth European Conference on Fracture, organised in Varna (Bulgaria) in 1992. He published 216 scientific papers, a chapter titled “Of J integral and J integral testing (with special focus on welded structures)” in the monograph “Nonlinear fracture mechanics”, issued by M. Wnuk, Springer, 1990 and the chapter titled “Welded pipelines, made of high strength steel, and the application of fracture mechanics parameters in structural integrity assessment” (co-author A. Sedmak) in the monograph “Safety, reliability and risk of water, oil

and gas pipelines”, issued by G. Pluvinage, Springer, 2007. He was the leader of 9 scientific research projects related to the behaviour of materials and welded structures under exploitation, pipelines, and criteria for revitalisation. He cooperated on 4 additional projects, wrote 37 studies, 8 investment programmes and 7 expertises. He was the advisor for 17 doctoral dissertations and 14 master theses. He was a member of the National Accreditation Committee according to the International Welding Institute rules.

Stojan Sedmak held a number of invited lectures: NIST (Boulder, Colorado), Duke University (Durham, North Carolina), University of Wisconsin (Milwaukee), University of Iowa (Iowa City), the Nuclear Research Centre, Ispra, Italy, Hsinhua University in Beijing, China and Faculty of Civil Engineering, Tripoli, Libya. He participated at numerous local and international conferences and meetings (European Conference on Fracture, International conferences on mechanical behaviour of materials, International conferences on fracture, Meetings of the International Welding Institute, American Society for Testing and Materials conferences, International conferences on fatigue).

As of 1980, Stojan Sedmak was the editor of a number of monographs involving fracture mechanics and structural integrity. Of particular significance are “Assessment of life of power plants using fracture mechanics” in 1990, and “From fracture mechanics to structural integrity assessment” in 2004, “The Challenge of Materials and Weldments” in 2006, and “Fundamentals of Fracture Mechanics and Structural Integrity Assessment methods” in 2009.

Stojan Sedmak’s scientific contribution to the analysis of behaviour and integrity assessment of welded structures is reflected in the conclusion that overmatching is suitable for higher strength and better crack resistance of welded joints, and that direct measuring of the J integral can be used to determine the crack driving force on a real structure as well. Thanks to Stojan Sedmak’s efforts, fracture mechanics and structural integrity analysis were established in our country, which lead to considerable international cooperation in this scientific field. He introduced a comprehensive approach to metal material characterisation, which, in addition to classic properties, defines the material using fracture mechanics parameters and impact characteristics



IFMASS 9, 2005, with Donka Angelova and Michael Wnuk



IFMASS 9, 2005, with Ljubica Milović and Stefan Vodenicharov



IFMASS 8, 2003, with Nenad Gubelj, Vencislav Grabulov, Franjo Matejček, Ljubica Milović and Dražan Kozak



At home 2012



Annual assembly DIVK 2005



Family photo, 2013, wife Matilda, son Aleksandar (being firmly supported to look to the future), grandson Simon and granddaughter Tea



Hydro powerplant Bajina Bašta, 1977, Stojan (forth from left) with associates



International Fracture Mechanics Summer School IFMASS (first from the left sitting)

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