

In Memoriam: Building on the Legacy of Elias P. Gyftopoulos (1927–2012) Entropy and Thermodynamics Made Rigorous



Elias Gyftopoulos was elected Fellow of the ASME in 1987 for his “landmark contributions to thermodynamics” and in 1995 was awarded the James Harry Potter Gold Medal, the highest ASME award in the field of thermodynamics, for “advancing the theory of thermodynamics to a new level, while clarifying basic concepts that had been generally misunderstood and while unifying the subject with quantum mechanics, and for the application of the science of thermodynamics in mechanical engineering, to industrial energy conserva-

tion, to energy policy, and to specific new technologies.”

Indeed, in the international thermodynamics community, he has been very influential. His crystal clear understanding of the entropy balance made him a leader in the 1970s and the 1980s, when the methods of availability analysis (today better known as second law analysis or exergy analysis) were being introduced systematically in the energy-systems engineering practice. This topic was central for the international group that started the ECOS conference series on Efficiency, Cost, Optimization, Simulation, and environmental impact of energy systems, which today gathers hundreds of energy experts, as well as for the Advanced Energy Systems Division of the ASME.

At these international meetings, Professor Gyftopoulos assumed for himself the role of an untiring paladin of rigorous treatments and definitions of thermodynamic concepts, in particular that of entropy. Several European and US colleagues in this broad community consider him as one of the greatest, most generous, and inspiring contributor to the field of thermodynamics of his time. Many are still grateful for the many lessons and the strength they derived from his direct criticisms, pungent presentations, and profound ability to connect theory and practice. All admired the enormous effort and intellectual honesty he put in fighting and digging for clear presentations and deeper understanding of the foundations of the subject, driven by his genuine gratitude—and we quote from one of his latest papers—“to the energy systems engineers of the past for their remarkable accomplishments,” and

his enthralling “promise that we will make every effort to understand the beautiful and powerful subject of thermodynamics so that we can continue the productive tradition established by the pioneers.”

The present memorial issue of JERT is intended to add to the published record of the ASME Transactions a series of papers that Elias Gyftopoulos contributed to the proceedings of various international meetings on Energy and Thermodynamics but were never submitted for journal publication. Several of these contents constitute the scientific background of his beloved textbook on the foundations and applications of Thermodynamics [1]. We are sure that the posthumous journal publication of these papers will honor his memory and help younger generations to engage in his promise.

For an account of his impressive biography, professional achievements, and honors, we refer to website,¹ where his complete scientific production is available, together with testimonials of his deep influence also outside of the Energy and Thermodynamics community, in particular, the MIT faculty, the Greek-American community, and the Energy Policy in Greece, as well as eulogies which portray the man Elias Gyftopoulos—“not at all an intimidating man,” “warm and charming, and extraordinarily generous with his time, a true gentleman,” rigorous, demanding, and exhilarating (and of course, at times a bit exhausting, etc.) with all his students and colleagues as well as with his wonderful family.

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Reference

- [1] Gyftopoulos, E. P., and Beretta, G. P., 2005, *Thermodynamics: Foundations and Applications*, Dover, Mineola, NY, 2005 (1st ed., Macmillan, New York, 1991).

¹www.EliasGyftopoulos.org