

Testimonial to Yehia El-Sayed

Yehia El-Sayed's academic, scientific, and professional life was entirely dedicated to understanding the principles underlying energy conversion processes and to possible ways of improving their efficiency. The title of his doctoral dissertation at Manchester University (1954) was "Heat transfer coefficients of air by forced convection through annular spaces and parallel to a bank of tubes", a theme that remains a very important topic in mechanical engineering. Later, he directed his attention to heat exchanger design, desalination processes and power plant optimization. As stated in Richard Gaggioli's testimonial, Yehia's career took him around the world; and both in his teaching and scientific writings, he made a constant and coherent effort to tackling complex problems starting from first principles. Though his name is perhaps best known in the field of Thermoeconomics, since he along with Bob Evans and Myron Tribus are the originators of this modern theory, he never neglected the practical side of engineering work as numerous papers on multi-effect and multi-stage desalination, gas/steam combined power plants, advanced energy conversion systems and components prove. Those of us who have had the privilege of listening to his lectures and seminars maintain a vivid memory of his problem solving strategy: clearly stating the problem, decomposing in simpler sub-problems, solving the simplified sub-tasks, introducing real effects, and recombining all of the above in a powerful synthesis. By reading his books and papers, it is clear that this method was the result of long training and a continual effort to avoid shortcuts: each important statement is either proven directly or properly referenced.

On several occasions, we "younger guys" made fun of his insistence in writing his own code (usually in FORTRAN and, if I am not mistaken, later in EES or MATLAB). Yehia's grinning response was invariably that "at least he knew that the calculations were correct", his way of telling us that it was we, perhaps, who had to re-check ours. In time, I convinced myself that Yehia's intuition in "seeing" the solution of very complex engineering problems derived from a deep understanding of Thermodynamics and an appreciation of its limitations. His publications covered a breadth of thermodynamic viewpoints (classical, information theory, irreversible/non-equilibrium thermodynamics, etc.), but he was not acritically committed to any. It was rather obvious that he had carefully studied different aspects of modern Thermodynamics, but it seems that he did not like to get involved in debates involving different 'schools' of thought. Nonetheless, he had an extremely sharp grasp of the 2nd Law and its consequences. An idea of his I like the most is that of vapour compression desalination in which he proposed using heat irreversibly generated through steam compression to induce further evaporation in the brine pool, demonstrating, I believe, an extraordinary phenomenological insight and engineering ingenuity.

Yehia combined Thermodynamics and Economics in two very different ways. He would calculate with amazing accuracy the monetary cost of a product on the basis of the structure of the technological chain from which it was produced (Engineering Economics), but he always insisted that the proper way of analyzing the cost formation process was by applying the principles of Thermoeconomics, which he pioneered and of which he was a most able user. In these modern times of "databases", it is perhaps sobering to remind ourselves that everyone who has worked in Thermoeconomics has used the El-Sayed tables of component cost and efficiency correlations.

Yehia was a very sharp, humorous, gentle person, in his personal, social and professional relationships. I have had direct experience of several instances in which his comments DID make the difference in a student thesis or a junior (and even a senior!) associate's research. His comments were never harsh or exceedingly critical. He liked to "show" the way rather than "forcing" one to follow it. I and many of my students have strongly benefited from our contacts with Prof. El-Sayed, which from a scientific point of view is the best legacy an academician can hope to leave behind.

We will miss Yehia the man, the teacher, the scientist, the friend. This special issue is but a small tribute to his influence, a far greater one residing in the fact that most of us will continue to use his methods and what he taught. "A real scientist never dies".

Enrico Sciubba
Guest Editor
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