

Manuel G. Velarde (1997-1999): My relation with ELGRA



Preliminaries and service to the ELGRA community

I do not remember when I joined ELGRA and for how long I was one of its members. What I do remember is that I started participating in space related activities as peer reviewer and member of panels for ESA in the eighties of past century. Then I became member of its MAC (1994-97) and that led me to ELGRA. Consequences of this involvement was, on the one hand, the activities I did as service to the ELGRA community and, on the other hand, the orientation of part of my scientific research. I participated at an ELGRA Symposium in Madrid in 1983 and secured its realization at UNED (Spanish Open University) quarters where I was Professor. In 1993 I organized at Universidad Complutense Madrid an ESA sponsored Symposium on interfacial phenomena on Earth and in space. Under the presidency of Prof Y. Malmejac, in 1994 I organized the ELGRA biennial conference and General Assembly that took place at U. POLITECNICA MADRID. Besides regular scientific presentations we had a special session open to the lay audience at

ATENEO of Madrid (where I had a Chair sponsored by the BBV Foundation) with participation of several ELGRA scientists and ESA astronaut C. Nicollier. I was the promoter of the ELGRA Medal securing its materialization by Spanish artist D. Blanco. At the closing session of the mentioned biennial meeting (with participation of ELGRA President and the then candidate-astronaut P. Duque, later an

experienced astronaut and at present Minister of Research and Universities of Spain) two medals were offered to the late Prof. I. Da Riva and to Dr J. Padday, respectively, for their outstanding and seminal research activities and service to ELGRA (a violin recital was given in memory of the former). I participated in several other ELGRA biennial meetings of which I remember one in Roma (1999) and another in Santorini (2005) where I delivered results of my research. In 1997 I was co-chairman of the St.Petersburg-Kiji ship conference on Physical Sciences in Microgravity conference, sponsored by ESA, ELGRA, NASA and the Soviet Space Agency. At various times I participated representing ESA and/or ELGRA at NASA-ESA-Soviet Space Agency-USSR Academy of Sciences meetings: Ottawa (1982, COSPAR), Boulder (1988, Workshop at the Center for Low-Gravity Fluid Mechanics), Moscow (1989, Institute for Problems in Mechanics, International Conference Plenary speaker "Interfacial phenomena: Oscillations and Chaos. Interfacial turbulence"), and Orlando (1999, Presidential welcome address

at ISGP on behalf of ELGRA). Further, along the years I have organized several international conferences: in 1986 on Physicochemical Hydrodynamics (La Rabida; an ELGRA management meeting took place there; proceedings published by Plenum Press), in 1992 an IUPAP Teaching Modern Physics Conference (Badajoz, with the presence of ESA and ELGRA representatives, and Cuban cosmonaut A. Tamayo and Director General of UNESCO Prof. F. Mayor; proceedings published by World Scientific). In 1998, sponsored by ESA and ELGRA, I organized in Madrid an IUPAP satellite workshop on interfacial phenomena. In 2000, I codirected a school on interfacial phenomena at CISM (Udine; lecture notes published by Springer) followed by several other workshops and schools in Spain (lecture notes published by World Scientific) and Morocco (with additional EPS sponsorship). I contributed two chapters (Fluids and transport phenomena, Critical phenomena) in the ELGRA "yellow" book European Low-gravity Physical Sciences in Retrospect and in Prospect (1995), a natural follow-up of the seminal document Challenges & Perspectives of Microgravity Research in Space (1981, ESA BR-05) by ELGRA founders Y. Malmejac, A. Bewersdorff, I. Da Riva and L. Napolitano. In 1998 at the 2nd European Symposium on the Utilization of the International Space Station (ESTEC), I coauthored with J. J. Favier a summary evaluation report on "Physical Sciences and Applications" contributions, ESA SP 433, pp. 663-664. In 2001, I reported on "Achievements and prospects of research in physical sciences in space" at the First International Symposium on Microgravity Research & Applications in Physical Sciences & Biotechnology, ESA SP-454, pp. 27-28. Finally, I was ELGRA Vice-President (1995-97) and President (1997-99).

Collaborative research following ELGRA aims

Largely motivated by my ESA and ELGRA related duties I was involved in the study of fluid physics and, in particular, interfacial phenomena. Major results achieved were: an in-depth study of the Benard-Marangoni (buoyancy-thermocapillary) convection (evolution of patterns and role of pattern defects and their influence on transport), clarification of the interplay of buoyancy with the Soret effect and double diffusion processes, elucidation of significant features of transverse (capillary-gravity) and longitudinal (dispersionless, alien to gravity) interfacial waves, and the prediction and subsequent experimental verification of interfacial solitons (which I called "dissipative solitons") all such waves driven by the Marangoni effect, predictions about the cooperation or competition between gravity and

Marangoni forces in falling liquid films, predictions about selfpropulsion of drops and bubbles (as traveling reactors or payload carriers) driven by the Marangoni effect and g-jitter –today in fashion due to the development of microfluidics, and a thorough study of the role of "surface forces" (Van der Waals and other Derjaguin-Casimir-DLVO forces) in wetting and spreading processes mostly in the absence of gravity. This activity led to numerous publications in scientific journals as well as chapters in ESA and ELGRA related books: Fluid Sciences and Materials Science in Space. A European Perspective, Springer, 1987 (edited by H. Walter), Low-Gravity Fluid Dynamics and Transport Phenomena, AIAA, 1990 (edited by J. N. Koster and R. Sani) and Physics of Fluids in Microgravity, Taylor & Francis, 2001 (edited by R. Monti). Besides, I coauthored five full

monographs: Nonlinear Dynamics of Surface-Tension-Driven Instabilities, Wiley, 2001 (with P. Colinet and J. C. Legros), Interfacial Phenomena and Convection, Chapman & Hall, 2002 (with A. A. Nepomnyashchy and P. Colinet), Liquid Interfacial Systems. Oscillations and Instability, M. Dekker, 2003 (with R. V. Birikh, V. A. Briskman and J. C. Legros), Wetting and Spreading Dynamics, Taylor & Francis, 2007, 2019-2nd ed. to appear (with V. M. Starov and C. J. Radke) and Falling Liquid Films, Springer, 2012 (with S. Kalliadasis, C. Ruyer-Quil and B. Scheid). These books based on research tuned to the ELGRA aims illustrate how fruitful has been the collaboration between scientists based in Spain, Belgium, France, Germany, former Soviet Union now Russia, the UK and the USA.

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Daniel Beysens: President of ELGRA 2003-2007

The first time I met ELGRA, it was in Madrid in 1983. ELGRA was only 4 years old, but yet very active. I remember the intense discussions at the General meetings but it was always possible to find solutions because the members had an extraordinary level of both professionalism and mutual confidence. ESA through its representatives and never ending human and financial support was present from the beginning as a positive force to make ELGRA a strong and representative Association of European scientists. But what has made up to now, in my view, the greatest originality and importance of ELGRA is the ability to join in the same Society scientists from both physical and life sciences having in common their enthusiasm for space and microgravity environment. More than collaborating on specific common actions, life and physical scientists have indeed to face the same questions and address the same problems: how to deal and use space weightlessness, vacuum, radiation of an extra-terrestrial environment. And last but not least, both communities have to deal with the same Direction of Human Spaceflight at ESA.



Maxus 5 rocket experiment in April 2003 (Esrange, Sweden)