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 efeffect 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)

Daniel Beysens

This creates a community and strengthen the professional and personal relationships between the members, who can influence in all Europe 'countries the policy of their government in favor of space related projects.

More than fostering the actions for the access to space – and this was a major step initiated in the first years of the new millennium - ELGRA has also a strong commitment for promoting microgravity (and more generally various gravity conditions) among the young scientists and students through support, organization of competition, educational programs. ELGRA also promotes the use of alternate means such as drop towers, parabolic flights, magnetic and electric fields, density matching systems, bed rest/head-down-tilt, clinostats to provide an alternative to extra-terrestrial environment. In support and/or in addition of the weightless studies, acceleration can be provided by vibrations and centrifuges.

I believe that the future of ELGRA is firstly to continue the way initiated 40 years ago by the founding fathers: foster close relationship between life and physical scientists in Europe, promote low gravity among the young generations and stimulate the governments and government agencies. 40 years is the maturity age. ELGRA should however remain inventive and look into the future to challenge itself.

Prof. Daniel Beysens, ESPCI Paris

Jack van Loon, 2007–2011: An overview about the past developments of gravity science over the last 40 years

Jack van loon monitoring crew operations of his 'BONES' experiment in the Experiment Monitoring Area (EMA) at the Kennedy Space Center (KSC) in Florida during the STS-42 / IML-1 flight launched 22 Jan. 1992.

As for quite some young human beings, space, the solar system and space flight where subjects that appealed to one's imagination. Especially when, as a young boy from 8 years, you are watching TV showing people walking and jumping on the surface of our Moon.

So I was very happy to enroll in a project at the Free University in Amsterdam in 1986 where the PI of this study, Paul Veldhuijzen, had received a grant to explore the impact of micro-gravity on the development of embryonic mouse bone rudiments in vitro. I was hired first as technician and later as the PhD student whose task was to prepare for this complex Space Shuttle experiment. The study was planned to be performed during the first International Microgravity Laboratory mission, IML-1 [1], initially targeted for a May 1987 launch. However, due to the tragic Challenger accident on 28 January 1986, the IML-1 mission was delayed for nearly 6 years till 22 January 1992.

Later that same year, on 29 December, we had the opportunity to also fly an experiment on the Russian Bion-10 mission [2] that was launched form Plesetsk. The preparation were done in Moscow where ESA had built a dedicated mobile laboratory to prepare for the various biological experiments. So one winter working in Florida at +25°C while the other winter in that same year working in Moscow at -25°C.