

## **LUCIANO GALFETTI**

Curriculum vitae

---

### **Education and academic career**

1977: Master degree in Aeronautical Engineering, Politecnico di Milano

1983: Specialization School in Energetics, Politecnico di Milano

1985: Assistant Professor, Politecnico di Milano

1992: Associate Professor of Aerospace Propulsion, Politecnico di Milano

2005: Full Professor of Aerospace Propulsion, Politecnico di Milano

Present position: Professor of Aerospace Propulsion and Combustion in Propulsion Systems, Aerospace Science and Technology Department of Politecnico di Milano

### **Main interests**

Combustion (homogeneous and heterogeneous), solid and hybrid rocket propulsion, thermochemistry, experimental characterization and optimization of solid fuels and propellants, energetic materials, combustion modeling.

### **Teaching activity**

Luciano Galfetti has been in charge of teaching activities for approximately thirty years in the field of combustion, air-breathing and space propulsion. Currently he is responsible for the course of Aerospace Propulsion (Bachelor degree) and Combustion Processes in Thermochemical Propulsion (MSc degree in Aeronautical Engineering). He follows and coordinates the activity of students working at the SPLab (the Space Propulsion Laboratory of Politecnico di Milano) for their thesis projects and laboratory activities.

He is member of the Aerospace Engineering PhD School at Politecnico di Milano.

From 2013 to 2018 he was Chair of the Aerospace Engineering Teaching Committee at Politecnico di Milano.

He was supervisor of hundreds of MSc theses and several PhD theses.

### **Research activity**

The research activity is in the area of aerospace thermochemical propulsion, focused on combustion issues. Innovative energetic materials for solid and hybrid rocket propulsion (such as nano-sized

materials, metal hydrides, or activated metal fuels for hybrid propulsion) as well as investigation of energetic compounds are addressed through thermodynamics, experimental characterization, or specific tools for characterization of heterogeneous material behavior. This research activity aims at the characterization and optimization of solid fuel and propellant combustion properties, focused on the increase of the delivered specific impulse.

Currently the attention is focused on hybrid rocket motors and liquefying solid fuels, paraffin-based, mainly for in-space propulsion applications. Nano-sized materials, their characterization, manufacturing of energetic materials, their thermal, rheological and mechanical characterization, and their combustion, as well as the design of lab-scale setup to investigate innovative solid fuels are complementary research activities in the reference frame of hybrid propulsion.

### **Responsibilities in projects and proposals**

Luciano Galfetti contributed to several FP7 and H2020 European projects:

- ORPHEE (Operative Research on Hybrid Engine in Europe), project 218830, funded under FP7-Space
- SPARTAN (SPAcE exploration Research for throttleable Advanced eNginE), project 262837, funded under FP7-Space
- HISP (High performance solid propellants for In-Space Propulsion), project 262099, funded under FP7 - Space)
- GRAIL (GReeN Advanced high energy propellants for Launchers, 2015-2018), project 638719, funded under H2020-Compet

also as work package leader, and cooperated with national and international past projects (FIRB, PRIN, CNES).

He was also national coordinator of the PRIN project: *"Sviluppo ed integrazione delle competenze scientifiche nazionali per l'avanzamento di propulsori spaziali di tipo ibrido"* (2011-2013), developed with Università di Roma "La Sapienza", Politecnico di Torino and Università di Napoli "Federico II".

He has been the executive manager for past contracts with private industries (AVIO s.p.a., MBDA).

### **Recent visiting**

1 – 31 March 2015

Visiting at JAXA (Japanese Space Agency), for joint activities about solid propellants and solid fuels combustion.

### **Other notes**

- Co-author of AIAA Paper No. 2016-4562, *Vortex Combustion in a Lab-Scale Hybrid Rocket Motor*, named as AIAA Best Hybrid Rockets Paper from the 2016 AIAA Propulsion and Energy Forum by the AIAA Hybrid Rockets Technical Committee.

- Co-author of AIAA Paper No. 2011-5680, *Ballistic and Rheological Characterization of Paraffin-based fuels for Hybrid Rocket Propulsion*, by L. Galfetti et al. bestowed the 2011 AIAA Best Paper Award by AIAA Hybrid Rocket Technical Committee.

- Co-author of *Numerical simulation of combustion processes in hybrid rocket motors*, by G. Gariani et al., presented at EUCASS 2009 and granted the Young Engineer of the Year Award 2010 by Eucass and Aerospace Testing Expo.

## **Selected papers in last ten years**

- V. Babuk, I. Dolotkazin, A. Gamsov, A. Glebov, L.T. De Luca, L. Galfetti (2009). *Nanoaluminum as a Solid Propellant Fuel*. JOURNAL OF PROPULSION AND POWER, Vol. 25, p. 482-489, ISSN: 0748-4658, doi: 10.2514/1.36841.
- L. De Luca, L. Galfetti, G. Colombo, F. Maggi, A. Bandera, V.A. Babuk, V.P. Sinditskii (2010). *Microstructure Effects in Aluminized Solid Rocket Propellants*. JOURNAL OF PROPULSION AND POWER, Vol. 26, p. 724-732, ISSN: 0748-4658, doi: 10.2514/1.45262.
- F. Maggi, A. Bandera, L. Galfetti, L.T. De Luca, T.L. Jackson (2010). *Efficient Solid Rocket Propulsion for Access to Space*. ACTA ASTRONAUTICA, Vol. 66, p. 1563-1573, ISSN: 0094-5765, doi: 10.1016/j.actaastro.2009.10.012.
- F. Maggi, G. Gariani, L. Galfetti, L.T. De Luca (2012). *Theoretical Analysis of Hydrides in Solid and Hybrid Rocket Propulsion*. INTERNATIONAL JOURNAL OF HYDROGEN ENERGY, Vol. 37, p. 1760-1769, ISSN: 0360-3199, doi: 10.1016/j.ijhydene.2011.10.018.
- L. De Luca, L. Galfetti, F. Maggi, G. Colombo, A. Reina, S. Dossi, D. Consonni, M. Brambilla (2012). *Innovative Metallized Formulations for Solid or Hybrid Rocket Propulsion*. HANNENG CAILIAO, Vol. 20, p. 465-474, ISSN: 1006-9941, doi: 10.3969/j.issn.1006-9941.2012.04.018.
- S. Cerri, M.A. Bohn, K. Menke, L. Galfetti (2013). *Aging of HTPB/Al/AP Rocket Propellant Formulations Investigated by DMA Measurements*. PROPELLANTS, EXPLOSIVES, PYROTECHNICS, Vol. 38, p. 190-198, ISSN: 1521-4087, doi: 10.1002/prop.201200186.
- S. Cerri, M.A. Bohn, K. Menke, L. Galfetti (2014). *Characterization of ADN/GAP-Based and ADN/Desmophen-Based Propellant Formulations and Comparison with AP Analogues*. PROPELLANTS EXPLOSIVES PYROTECHNICS, Vol. 39, p. 192-204, ISSN: 0721-3115, doi: 10.1002/prop.201300065.
- S. Cerri, M.A. Bohn, K. Menke, L. Galfetti (2014). *Aging of ADN Rocket Propellant Formulations with Desmophen-Based Elastomer Binder*. PROPELLANTS EXPLOSIVES PYROTECHNICS, Vol. 39, p. 526-537, ISSN: 0721-3115, doi: 10.1002/prop.201300124.
- M. Boiocchi, L. Galfetti, L.A. Di Landro (2016). *Paraffin-based Solid Fuels for Hybrid Propulsion Filled with Lithium Aluminum Hydride: Thermal, Mechanical and Ballistic Characterization*. INTERNATIONAL JOURNAL OF ENERGETIC MATERIALS AND CHEMICAL PROPULSION, Vol. 15, p. 501-527, ISSN: 2150-766X, doi: 10.1615/IntJEnergeticMaterialsChemProp.2017016259.
- M. Boiocchi, L. Galfetti, L.A. Di Landro (2018). *Preliminary kinetic characterization of lithium-aluminum based hydrides for airbreathing propulsion*. JOURNAL OF PROPULSION AND POWER, Vol. 34, p. 48-57, ISSN: 0748-4658, doi: 10.2514/1.B36307.
- F. Maggi, S. Dossi, C. Paravan, L. Galfetti, R. Rota, S. Cianfanelli, G. Marra (2019). *Iron oxide as solid propellant catalyst: A detailed characterization*. ACTA ASTRONAUTICA, Vol. 158, p. 416-424, ISSN: 0094-5765, doi: 10.1016/j.actaastro.2018.07.037.
- C. Paravan, A. Verga, S. Dossi, F. Maggi, L. Galfetti (2019). *Aluminum powders: aging effects on metal content and thermogravimetry reactivity*. SCIENCE AND TECHNOLOGY OF ENERGETIC MATERIALS, Vol. 80, p. 1-6, ISSN: 1347-9466.
- C. Paravan, A. Verga, F. Maggi, L. Galfetti (2019). *Accelerated ageing of micron- and nano-sized aluminum powders: Metal content, composition and non-isothermal oxidation reactivity*. ACTA ASTRONAUTICA, Vol. 158, p. 397-406, ISSN: 0094-5765, doi: 10.1016/j.actaastro.2018.08.001.