

Hypersonic flows and electromagnetic field

Dr. Domenico Giordano

January 18, 2018 (Thursday), 12 pm, room 7.1.H01

The presentation, mainly of theoretical nature, centres on the interplay between the physical phenomenology of ionised gas-mixture flows in thermochemical non-equilibrium (Navier-Stokes equations) and the electromagnetic field (Maxwell equations). The driving engineering application is spacecraft thermal protection during atmospheric (re)entry. The main characteristics of the fully-coupled set of governing equations are discussed; aspects bearing on physical consistency are emphasised and contrasted with routinely applied simplifications that are not always justified.



Short Bio. Dr. Giordano have been staff member of ESA for 30 years occupying a post in the aerothermodynamics section of ESTEC, where he acquired expertise in several branches of fluid dynamics particularly connected to space applications involving hypersonic flows in thermochemical non-equilibrium (atmospheric reentry, for example) and in related fundamental disciplines (statistical and axiomatic thermodynamics, elements of quantum mechanics, chemical and thermal kinetics, etc.). His responsibilities included roles as technical officer for ESA programmes, principal researcher for advanced fluid dynamics, and support engineer for ESA's projects. As such, he has been visiting scientist in several academic and applied-research institutions all over the world. He has been visiting professor in the Von Karman Institute for Fluid Dynamics in 2012-2014, delivering courses on 'physical fluid dynamics' and 'fundamental disciplines of aerothermodynamics'. He retired from ESA on May 2017, enjoying now a more tranquil life, but he is still active in doing scientific research in fluid dynamics and related disciplines.