europass

Valerio Orlandini

WORK EXPERIENCE

17/04/2023 – 31/10/2023 Rome, Italy

SCHOLARSHIP LA SAPIENZA

- Aerocapture maneuver
- Fluid-structure interaction
- Shock-fitting methods
- Inflatable structures

Business or Sector Professional, scientific and technical activities | **Department** Mechanical and aerospace engineering

EDUCATION AND TRAINING

20/01/2020 – 26/01/2023 Roma, Italy

LAUREA MAGISTRALE IN INGEGNERIA AERONAUTICA Università degli Studi di Roma "La Sapienza"

- Fluid-structure interaction
- Aerocapture
- Shock-fitting
- Inflatable shields

Website https://www.uniroma1.it/it/pagina-strutturale/home | **Field of study** Fluid-structure interaction | **Final grade** 109/110 |

Thesis Inflatable shield for aerocapture missions with drag modulation

20/01/2016 – 23/07/2019 Roma, Italy

LAUREA TRIENNALE IN INGEGNERIA AEROSPAZIALE Università degli Studi di Roma "La Sapienza"

Website https://www.uniroma1.it/it/pagina-strutturale/home

01/11/2023 – CURRENT Roma, Italy

PHD STUDENT Università degli Studi di Roma "La Sapienza"

Website https://phd.uniroma1.it/web/VALERIO-ORLANDINI_nP1693721_IT.aspx |

Field of study Interaction fluid-structure and aerocapture

LANGUAGE SKILLS

Mother tongue(s): **ITALIAN**

Other language(s): **ENGLISH**

PUBLICATIONS

2023

A fluid dynamics technique to model inflatable structures within a hypersonic flow during aerocapture missions

This study introduces a novel technique for investigating fluid-structure interaction during hypersonic aerocapture maneuvers on Mars. The technique involves using shock-fitting methods to treat gas dynamic discontinuities as internal contours of the fluid dynamic field, which can be applied to inflatable shields due to their thin structure. One

of the main challenges of aerocapture maneuvers is the uncertainties in atmospheric density caused by errors in models or natural events. The study developed a Continuously Variable drag modulation technique to compensate for these uncertainties extracting an aerodynamic database linking the values of 01D436 01D437 01D434 to the inflation pressures of the shield. The density compensation range for a shield with the same geometry as Pathfinder and the same ballistic coefficient was determined to be -4.5% to +43%. The study proposes two possible solutions for unexpected density variations during aerocapture: combining CV drag modulation with Single-Step drag modulation for higher density, and using a double control system with a 20 cm diameter toroid to increase the compensation range to -27% to +43% for lower density.

Link https://doi.org/10.2514/6.2023-4425.vid

2023

A NUMERICAL TECHNIQUE FOR MODELLING HYPERSONIC INFLATABLE SHIELDS

This paper describes a recently developed numerical technique to simulate high-speed flows on complex 3D inflatable structures using tetrahedral volume grids. In detail, the proposed methodology is based on the front-tracking approach, as it involves the coupling between a shock-fitting technique and a non-linear structural solver: by doing so, we are able to exploit the well-known advantages of shock-fitting regarding the computation and modelling of gas-dynamic discontinuities to deal with fluid-structure interaction problems. More details about the proposed technique and some applications to inflatable structures in hypersonic flows are presented in this paper.

HONOURS AND AWARDS

12/05/2021

Introduction to ANSA for CFD and FEA – BETA CAE Systems

07/12/2022

Introduction to pre processing with ANSA and solving with Epilysis – BETA CAE System

DRIVING LICENCE

Driving Licence: AM

Driving Licence: A1

Driving Licence: B1

Driving Licence: B

SCHOLARSHIP

17/04/2023 – 31/10/2023

Calculation of hypersonic flows around inflatable shields of space probes for atmospheric re-entry or aerocapture applications